PIBS 232E

STOPPING
WATER POLLUTION
AT ITS SOURCE

MISA
Municipal/Industrial Strategy for Abatement

EVALUATION OF MUNICIPAL SEWER USE CONTROL OPTIONS - PAHSE II EFFECTIVENESS - COST EVALUATION AND POLICY RECOMMENDATION

Ontario
Ministry
of the
Environment

Jim Bradley
Minister

MUNICIPAL-INDUSTRIAL STRATEGY FOR ABATEMENT
(MISA)

EVALUATION OF MUNICIPAL SEWER USE
CONTROL OPTIONS - PHASE II
EFFECTIVENESS - COST EVALUATION
AND POLICY RECOMMENDATION

Prepared for Environment Ontario

by

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TABLE OF CONTENTS

PAGE

1. INTRODUCTION 1
    - 1.1 MISA program 1
    - 1.2 Scope of MISA: Direct and Indirect Discharges 1
    - 1.3 Objectives and Phasing of This Study 3
    - 1.4 Phase I Results 4
        - 1.4.1 Objectives of Phase I 4
        - 1.4.2 International Jurisdictions 5
            - 1.4.2.1 United States 6
            - 1.4.2.2 France 7
            - 1.4.2.3 Germany 8
            - 1.4.2.4 England 9
            - 1.4.2.5 Japan 9
            - 1.4.2.6 Canada 10
        - 1.4.3 Short List of Policy Options 11
    - 1.5 Phase II: Detailed Evaluation: Scope and Approach 11
        - 1.5.1 Effectiveness 11
        - 1.5.2 Cost 16

2. HOW THE SHORT LIST OF OPTIONS WAS DETERMINED IN PHASE I 18
    - 2.1 Approach to Control Option Definition 18
    - 2.2 Unique Descriptors for Control Options 19
    - 2.3 Selection of Options for Detailed Evaluation 22

TABLE OF CONTENTS
(continued)

PAGE

3. OPTION EFFECTIVENESS EVALUATION 25
- 3.1 Introduction 25
- 3.2 Option Definition (Step 1) 27
- 3.3 Sub-Factor Definition (Step 2) 30
- 3.4 Option Effectiveness Assessment (Step 3) 37
  - 3.4.1 PS-1 37
  - 3.4.2 PS-2 39
  - 3.4.3 PS-3 40
  - 3.4.4 PS-4 42
  - 3.4.5 PS-5 43
  - 3.4.6 IEQS-1 44
  - 3.4.7 IEQS-2 46
  - 3.4.8 IEQS-3 47
- 3.5 Effectiveness Ranking by Technical Effectiveness (Step 4) 47
- 3.6 Effectiveness Ranking by Economic and Administrative Effectiveness (Step 4) 54
- 3.7 Effectiveness Ranking by Legislative Effectiveness (Step 4) 61
- 3.9 Summary of Option Rankings 64
- 3.10 Overall Program Effectiveness (Step 5) 65

4. PROGRAM COSTS 67
- 4.1 Introduction (Step 6) 67
- 4.2 PS versus IEQS for Effluent Discharge Basis 67
- 4.3 Senior versus Junior Regulation Enforcement Agency 70
- 4.4 Cost versus Incentive for Fiscal Policy 70
- 4.5 Conclusion 71

TABLE OF CONTENTS
(continued)

PAGE

5. RECOMMENDED PROGRAM 72
- 5.1 Introduction (Step 7) 72
- 5.2 Specific Aspects of the Recommended Option 73
  - 5.2.1 Basis for the Standards and their Development 73
  - 5.2.2 Monitoring 74
  - 5.2.3 Regulation of Discharges to Other Media 75
  - 5.2.4 Household Toxics 75
  - 5.2.5 Allowance for Industrial Cooperation 75
  - 5.2.6 Legislative Requirements 75
- 5.3 Issues for Further Study 77
  - 5.3.1 Technical and Economic Issues 77
  - 5.3.2 Economic and Financial Issues 78
  - 5.3.3 Administrative Issues 79
  - 5.3.4 Legislative Issues 79

REFERENCES

APPENDIX A A-1
- PS-1 A-1
- PS-2 A-9
- PS-3 A-13
- PS-4 A-20
- PS-5 A-24
- IEQS-1 A-28
- IEQS-2 A-36
- IEQS-3 A-40

EXECUTIVE SUMMARY

This report represents Phase II of a study of Municipal Sewer Use Control Options designed to identify a preferred program for Ontario which will control industrial discharges to sewers and meet the goal of The MISA Program.

The Phase I Report was submitted to the Ministry on September 16, 1987. It outlined the results of a survey of sewer use options being used in Canada, the United States, United Kingdom, France, West Germany and Japan. The programs in the various countries were described in detail, including information on technical, legislative, economic and administrative effectiveness aspects. Using a number of "exclusionary criteria", the programs from Canada, United Kingdom and Japan were excluded and of the existing programs only those from the United States, West Germany and France were selected for detailed evaluation. In addition, four hybrid programs were developed using existing programs and adding selected elements. Altogether, eight sewer use control options were included for detailed evaluation in Phase II.

For the sewer use control options studied, two fundamentally different types of standards were identified. Pretreatment Standards (PS) and Industrial Effluent Quality Standards (IEQS).

A Pretreatment Standard (PS) defines a permissible concentration or mass emission of contaminant per unit of production specific to an industrial category and based on Best Available Technology, Economically Achievable (BATEA).

The United States and French programs were shown to conform to the PS model.

An Industrial Effluent Quality Standard (IEQS) defines a permissible concentration and mass emission of a contaminant for industry in general.

The existing German program was found to conform to the IEQS model, although since 1986 Germany has been moving towards a PS type program.

While PS and IEQS were convenient and appropriate labels to define the various existing programs, it became inappropriate to use such absolute terms as we developed a preferred system for Ontario which may have elements of both systems. Indeed, all the existing programs fell somewhat between the two definitions.

A number of unique descriptors were developed which allowed different programs (options) to be broken down into more simple elements for comparative purposes. The descriptors referred to the level of authority for regulation setting and enforcement, the nature of the legal system, and the fiscal aspects of sewer use controls.

The approach used to carry out the detailed evaluation of th options identified in Phase I was an effectiveness-cost approach. The effectiveness of a sewer use control option i a measure of how well the program:

- meets its goal of abating the discharge of pollutants from industrial outfalls into the municipal sewer syste and;

- minimizes subsequent impacts on the environment.

The costs of an option are divided into monetary and social costs and are used only after the effectiveness ranking is complete, in effect to confirm (or modify) the ranking produced from effectiveness considerations.

The effectiveness of a sewer use control option was measured using four factors:

- technical effectiveness;
- economic effectiveness;
- legislative effectiveness;
- organizational and administrative effectiveness.

Each of the above factors was then sub-divided into a number of sub-factors. Detailed questionnaire responses from the various international jurisdictions were then related to the sub-factors. The collected data was then analyzed to identify strengths and weaknesses of the various options and their applicability to Ontario.

The evaluation of options then took place through a qualitative comparison of the eight options considered, by factor. From this comparison, a list of options was constructed, ordered (ranked) as to preference according to each of the factors: technical, economic, legislative, and, organizational and administrative effectiveness. A preferred option, based on overall program effectiveness, was then identified. Cost considerations were then applied and a modified ranking was developed.

The evaluation process identified a program based on the one now in place in the United States, with the addition of a more formal incentive program for industrial compliance as the preferred option for Ontario. Broadly, this option is defined as follows:

- a categorical pre-treatment standard based on BATEA that also utilizes industrial effluent quality standards for industrial categories not specifically addressed;

- regulations set by the province with allowance for municipalities to set more stringent standards ("local limits") if desired, provided they can demonstrate a need based, for example, or local receiving water quality impact;

- regulations are enforced by the local or regional municipalities (with Provincial auditing) except in these cases where the local capability does not exist, in which case the Province takes over the role of enforcer;

- a fiscal incentive program is applied to encourage compliance and continued improvements in the effectiveness of the control program over time.

1. INTRODUCTION

1.1 MISA Program

The Municipal-Industrial Strategy for Abatement (MISA) was announced in June 1986 by the Minister of the Environment in the form of a White Paper(1). The White Paper was subtitled "A Policy and Program Statement of the Government of Ontario on Controlling Municipal and Industrial Discharges into Surface Waters". This subtitle fairly summarized the scope of the White Paper and the goal of the MISA program was clearly stated early in the document:

> "MISA's ultimate goal is the virtual elimination of toxic contaminants in municipal and industrial discharges into waterways."

This goal will be realized through an abatement program that deals with specific toxic contaminants by regulating their discharge at source in a uniform program across Ontario.

1.2 Scope of MISA: Direct and Indirect Dischargers

The objective of the MISA initiative is to be accomplished by regulating direct discharge to surface water or indirect discharge through municipal sewage collection and treatment systems.

Direct Dischargers

The direct dischargers of wastewater to surface water in Ontario comprise 300 industries and approximately 400 municipal sewage treatment plants. The MISA program will initially consider the direct dischargers in eight industrial sectors.

- petroleum refining
- organic chemicals
- pulp and paper
- metal mining and refining
- iron and steel
- electric power generation
- inorganic chemicals
- industrial minerals

Two hundred of the 300 direct dischargers will be covered by regulations in these sectors. The Ministry plans to cover the remaining direct dischargers in a latter phase of the MISA initiative. The industrial category regulations (monitoring and abatement) are to be developed with pre-regulation consultation and cooperative monitoring. Technical subcommittees, established by industrial sector and for the municipal sector, have been formed to coordinate these studies.

Indirect Dischargers

At present the control of indirect discharges to the Province's waterways (i.e. the industrial users of the municipal sewer system) has been by local municipal by-laws which concentrate on conventional parameters. A new model by-law (October 1987) has strengthened these provisions.

In responses to the MISA White Paper (Ref. 2, p.34), Environmental advocacy groups maintained that the indirect discharges represent as great an environmental concern as the direct discharges. The Ministry agreed. The public would like to see stronger controls on indirect discharges. Also falling out of this concern was the requirement to assess the need for assistance in enforcement activities currently carried out by municipalities.

1.3 Objectives and Phasing of This Study

The objectives of this study are:

- to assess alternatives for control of industrial and domestic use of municipal sewers;
- to identify a preferred control option(s) which can be subjected to debate and scrutiny by the public, industrial sectors and municipalities before selection.

The study was completed in two phases. Phase I surveyed the experience of sewer use control in North America, Europe and Japan. Successful sewer use control programs were documented in Phase I including information on the technical, legislative, economic and administrative effectiveness of the control programs. From the programs surveyed, four programs were selected for detailed evaluation. In addition, hybrid programs were developed which included the more desirable features of the programs studied. These hybrid programs were also included for detailed study. Phase II of the study completed the detailed evaluation. This report details the findings of Phase II of the study.

1.4 Phase I Results

1.4.1 Objectives of Phase I

Phase I of this study had the overall objective of developing a short-list of control options which could be studied in detail for their applicability to the Ontario situation. In order to develop an appropriate list, existing sewer use control strategies were surveyed in countries known to have advanced systems. These were Canada, United States, United Kingdom, France, Germany and Japan.

The requirements for a detailed comparison of a list of control options identified meant that a number of basic features of the control options had to be separated out for consideration. Most importantly, it was vital to understand the regulatory framework of the option, what laws governed the regulation, who enforced the law, what properties of the wastes were regulated and whether the regulations considered the differences among the sewer users being regulated. Also, within each system, it was important to understand how strictly the regulation was enforced and whether industries were offered any fiscal incentives to abate pollution.

In order to further develop comparative bases for the options, it was important to develop information on the industries discharging to the sewers, the natural physical environment, the type of municipal infrastructure in place to handle sewage and the various administrative aspects of the control option, such as monitoring of effluent quality.

Data was collected using one of two detailed, standard questionnaires (one for the senior level of government and one for the junior level). The data collected was organized into descriptive accounts of sewer use control in the various jurisdictions. The options were screened to first exclude options not meeting primary MISA objectives or those incompatible with Ontario's jurisdictional framework. This resulted in a short list of four options from three countries (U.S.(2), France and Germany). A further four options (hybrids) were developed using the real experience from these three countries and blending elements of their programs in combinations across jurisdictional boundaries. These eight options became the short-list of options for detailed study in Phase II. A more detailed discussion of the development of this short-list is given in Section 2.

1.4.2 International Jurisdications

For the sewer use control options studied, two fundamentally different types of standards were identified: Pretreatment Standards and Industrial Effluent Quality Standards. Definitions of these standards are provided below:

> Pretreatment Standard (PS) defines a permissible concentration or mass emission of contaminant per unit of production specific to an industrial category and based on Best Available Technology, Economically Achievable (BATEA).
>
> Industrial Effluent Quality Standard (IEQS) defines a permissible concentration and mass emission of a contaminant for industry in general.

Programs examined were considered under these two main classifications and other subsidiary features highlighted in Table 2.2 (Page 23).

1.4.2.1 United States (PS)

Sewer use control in the United States is based on pretreatment standards for over 20 categories of industrial dischargers. Effluent limits are also set for selected chemicals from a list of 126 "priority pollutants". Industrial dischargers can also be subject to more stringent local limits established to allow the publicly owned treatment works (POTW) to meet its discharge criteria. Pretreatment standards require treatment at source and are based on Best Available Technology (BAT) in each industrial category established through actual experience with the technology.

In the U.S. the federal government (through the Environmental Protection Agency or EPA) is ultimately responsible for setting regulations although they normally delegate the enforcement of the regulation to state and local POTWS. In this way, two different programs were identified in the U.S., depending on whether the POTW (junior level) or the EPA or state (senior level) enforced the regulations at the local level.

The U.S. program is applied uniformly across the country, although the local limits provision can produce some local inconsistencies based primarily on the assimilative capacity of the local receiving water.

1.4.2.2 France (PS)

France uses a categorical pretreatment standard approach similar to that found in the United States. The French have identified a larger number of categories of industry (418). Industry is required to provide information in order that the national government can determine the category into which their operation falls - the so-called 'Installation Classe' - and then abide by a standard set of regulations, developed regionally, usually based on best available technology which is economically achievable, for that category or 'Installation Classe'.

Regulations for Installations Classes are made at a Regional level which is really a grouping of regional departments of the national government. The regulations vary by Region based on the input from different national ministries and a local panel of experts on the relative importance of environmental concerns in a region. For industries not designated as Installation Classe, the municipal government can enact local regulations to control discharges to the sewer system. These local regulations usually take the form of a contract between the municipality and the industry.

Although many of the ownership and operating functions are delegated to the lowest level, the enforcement of the regulations remains at the Regional offices of the national government.

A unique feature of the French system is the use of a 'pollution coefficient' to determine the charge for the use of a sewer. 'Normal' loadings are determined for each 'Installation Classe' and the actual loading by an industrial establishment can increase or decrease the charge made for sewer use. This is viewed as a fiscal incentive to the abatement of pollutant loading.

1.4.2.3 Germany (IEQS)

An industrial effluent quality standard approach has been in use in Germany. This approach has used the performance of generally achievable technology to address pollutant loading across all industry. This is a response to severe pollutant loadings in Germany that have caused the strictest limits to become generally applicable to all industry.

German laws are uniform across the federal republic but are developed to meet the needs of German States or Lander. The German federal government must consult a Council of the Lander so that state environmental standards are enshrined in uniform national laws. The Lander have an agency - LAWA - Lander Working Group for Water and Waste - that implements the regulations. Operation of the sewage system and enforcement of the sewer use control regulations is delegated to the lowest - municipal - level of government.

The German experience in the use of uniform industrial standards is relatively limited because initiatives in Germany are moving them towards the categorical pretreatment type of regulation. In spite of this, their experience is useful as a comparison of the two basic approaches of uniform effluent quality standard and categorical pretreatment standard.

1.4.2.4 England (IEQS)

Among the systems used in the United Kingdom, the English system is the most highly developed and is unique among the control options studied. England is divided into ten watershed authorities. Within each watershed, a Water Authority looks after all matters related to the water cycle from water supply through waste treatment.

The English approach is to evaluate each proposed sewer use on the basis of its impact on the local sewage works and receiving water body. The existing and potential use of the receiving water body is considered, and allowance is provided for the assimilative capacity of the receiving water body. Use of the sewer is embodied in a Consent given after all impacts have been assessed. Recourse to an independent assessment by the State provides an appeal mechanism against administrative decisions.

The English system also considers the loading of conventional water pollution parameters in establishing the charge for sewer use. However, this system potentially permits the discharge of toxics provided the sewage works and/or the receiving water body are not adversely affected. As such, the English control option failed a primary (exclusionary) screening criterion and was dropped from the short-list for detailed study.

1.4.2.5 Japan (IEQS)

The Japanese differentiate among the various unit operations comprising a waste water treatment system. Each unit operation is assigned a nominal performance and in combination a treatment system has its performance defined.

This becomes, in effect, an industrial effluent quality standard. This type of standard has been developed and applied uniformly across the country with some differentiation among receiving water body type; river, lake or sea.

The Japanese system appears to be in the early stages of development with only a limited list of control parameters focusing principally on conventional pollutants and not toxics. This lack of regulation of toxics excluded the Japanese system from further consideration in this study.

1.4.2.6 Canada (IEQS)

In Canada, the Ontario Model By-Law (April 1987 as revised October 1987) is as advanced a system as exists anywhere in Canada. It recommends a uniform industrial effluent quality approach to sewer use control. In this latest form of model by-law, some attention has been paid to reducing toxics discharge although the available legal framework limits the general applicability to the MISA objective.

A model sewer use control by-law is prepared by the Ministry of the Environment (MOE) in consultation with the municipalities which actually adopt and enforce the model by-law. Municipal by-laws are authorized under the Municipal Act.

The model by-law, if adopted by municipalities, will not categorically prevent discharge of toxics to the sewers. The Ontario (Canadian) system has not resulted in uniform standards across the province and, as a result, was dropped from detailed evaluation in Phase II of this study.

1.4.3 Short List of Policy Options

Based on the analysis presented above, sewer use control systems in the United States, France and West Germany were retained for further consideration. From these four experiences (two systems in the United States), a short list of eight policy options were developed in Phase I. The four additional options were "constructed" from the four actual cases. A detailed discussion of the determination of these options is provided in Section 2.

1.5 Phase II: Detailed Evaluation: Scope and Approach

The approach chosen to carry out the detailed evaluation of the options identified in Phase I was an effectiveness-cost approach. Effectiveness and cost of a particular option are identified separately. Options are then ranked as to effectiveness, with several being potentially acceptable for Ontario. Costs are not used in the initial comparison to rank options, but only later to reassess the effectiveness ranking. An introductory overview of the scope and approach is provided here under separate headings for effectiveness and cost; a detailed description of the process of evaluation is provided in Section 3, Option Effectiveness Evaluation and in Section 4, Program Costs.

1.5.1 Effectiveness

The effectiveness of a sewer use control option is a measure of how well the program meets its goal of abating the discharge of pollutants from industrial and domestic outfalls into the public sewage collection and treatment system. It is important to point out that while the primary MISA objective is to eliminate toxic discharges to surface water, sewer use control programs are required to address all potential disposal options. Specifically, MISA objectives require that the sewer use control options be evaluated on the basis of protecting:

- surface receiving waters;

- sewage workers who might be exposed while working at the plant or in the sewer system;

- agricultural land that might receive sewage sludge;

- air that might receive volatilized toxics from sewage or emissions from sludge incineration; and,

- the sewage works and sewage works processes.

The effectiveness of a sewer use control option can be measured using four factors:

- technical effectiveness
- legislative effectiveness
- economic effectiveness; and
- organizational and administrative effectiveness.

Each of these factors can be subdivided into a number of subfactors for which the data relating actual experience can be set aside to characterize the effectiveness. These factors are listed in Table 1.1 and are fully defined in Section 3.

TABLE 1.1
SEWER USE CONTROL OPTION EFFECTIVENESS
DIMENSIONS OF EFFECTIVENESS

Factor		Sub-Factor
TECHNICAL EFFECTIVENESS	T1	Water Quality Improvement
	T2	Intermedia Transfers
	T3	Industrial Compliance
	T4	Monitoring
	T5	Program Review and Updating
	T6	Regulatory Comprehensiveness
	T7	Analytical Feasibility
	T8	Regulation Basis
ECONOMIC EFFECTIVENESS	E1	Efficiency
	E2	Cost Effects on Industry
	E3	Cost Effects on Municipalities
	E4	Perceived Fairness
	E5	Potential to Mitigate Cost Effects

TABLE 1.1
SEWER USE CONTROL OPTION EFFECTIVENESS
DIMENSIONS OF EFFECTIVENESS
(continued)

Factor	Sub-Factor
LEGISLATIVE EFFECTIVENESS	L1 Procedure Leading to Prosecution
	L2 Ability to Prosecute
	L3 Success in Prosecution
	L4 Challenges to the Law
	L5 Legal Non-Compliance
	L6 Time to Implement Program
	L7 Flexibility of Legislation
	L8 Understandability of the Legislation
ORGANIZATIONAL & ADMINISTRATIVE EFFECTIVENESS	A1 Enforcement Agency Resources
	A2 Municipal Resources
	A3 Lab Capability
	A4 Record Keeping Requirements

With the foregoing factors in mind, expert(s) in each of the major group areas were requested to assess the various options. From the data collected for each of the options selected for detailed study, the responses for each subfactor were extracted and recorded (Appendix A). From these responses, a summary was generated covering each factor in total. The next step, summarizing the strengths and weaknesses of the control options, involved some input of professional judgement on the part of the experts. More judgement was then exercised in detailing how an option might be applied in Ontario.

This completed the assessment of the options effectiveness; the next step involved the evaluation of options. This took place through a qualitative comparison of desirable and limiting qualities, by factor, of the eight options considered for further study. A qualitative approach was used, rather than a quantitive one, for three reasons. First, the limited level of detail in the data gathered did not allow for a meaningful quantification of effectiveness. Second, many factors did not lend themselves to quantification (e.g. flexibility in the legislation). Finally, different levels of detail in the questionnaire responses between juridsictions would not allow for quantitative differences to be established.

From the comparison, it was possible to construct a list of options ordered as to preference according to each of the effectiveness factors; technical, economic, legislative and organizational and administrative. This process allowed each expert to draw conclusions regarding which program subcomponents would be desirable regardless of the option selected. This recognizes the two level nature of this exercise.

At the first level, programs are compared based on gross differences, all else being held equal. This allows for an identification of the general directions that the sewer use control program should follow. At the second level, specific program elements are defined.

Where appropriate, given the information base used, some program element preferences are indicated. Issues of relevance to the sewer use control program that cannot be appropriately addressed, based on the survey responses, are identified in the final section of this report for further study.

The individual rankings, by factor, were then combined to form an overall ranking of options using a qualitative approach, considering differences in effectiveness by factor and making judgements regarding the relative importance of each factor. A preferred option based on overall program effectiveness, was finally identified.

1.5.2 Cost

Through the use of the questionnaire approach, it was possible to generate only a limited data base on program costs. Ideally, it would be desirable to determine both monetary and social costs associated with each option. Monetary costs are the direct outlays that can be quantitatively identified for industry and government. Social costs are defined as changes in the enjoyment of life experienced by society.

Social costs are difficult to identify and assess even in a qualitative fashion. Therefore, only monetary costs were considered in this analysis. Monetary costs include the following:

- cost of treatment facilities both for industry or municipalities;
- implementation costs, including training and awareness programs in government and industry;
- monitoring and auditing costs for industry and the regulator;
- documentation costs and assessment of program effectiveness through, for example, water quality assessments.

Since the questionnaires were only developed for the regulation setting and enforcement agencies, no industry costs could be determined. Further, due to local accounting anomolies, different questionnaire respondents provided different program cost elements (e.g. some municipalities put program related costs in "general activities" accounts). Therefore, a complete and consistent inventory of government cost was not possible to generate.

Although it was not possible to determine actual program costs, it was possible to identify a subset of municipal costs that are relatively consistent among options. These costs are used for comparative purposes.

Costs are not used to rank options. Rather, they are used to reassess the rankings developed through consideration of program effectiveness.

2. HOW THE SHORT LIST OF OPTIONS WAS DETERMINED IN PHASE I

2.1 Approach to Control Option Definition

This study has set out to survey world-wide sewer use control experience and through a process of evaluation develop a list of preferred options for Ontario. Phase I produced a list of options that met broad criteria for applicability to Ontario.

An important initial step was the choice of countries for study. Sewer use control programs were selected from countries known to have advanced waste water treatment programs. These were also countries with well developed economies. Sewer use control in all cases had at least begun to address the issue of indirect discharge of toxics.

The MISA initiative (1) defined goals and methods for the control of direct dischargers. For an option to be viable, these objectives and goals must be met for indirect dischargers (users of the municipal sewers). If not, these options, by definition would not be suited to MISA. In addition, it was important that the option considered should be compatible with the regulatory system in Ontario. These considerations were incorporated in the following definitions of Exclusionary Criteria, for control options:

1. Compatibility with the Ontario MISA objective of virtual elimination of toxics in discharge to surface water. Chemicals must be controlled through specific control limits for the chemical's toxic characteristics.

2. Compatibility with MISA methods of setting the chemical control limits which are to be based on either best available technology (economically achievable) (BATEA) or on receiving water quality derived from a receiving water quality impact assessment which may be even more stringent in some cases than BATEA.

3. Compatibility with the basic jurisdictional framework of Ontario, which has a set of powers in the area of water and wastewater control which may be delegated from the Province through Regional Municipalities (or organized counties) or directly to municipalities (or townships).

In the Phase I report of this study, the basis used for the setting of the discharge controls was one outstanding feature of the sewer use control options. As discussed previously, two types of control programs were found in the existing sewer use control programs that were studied: Pretreatment Standards and Industrial Effluent Quality Standards.

In summary, therefore, the options used in the detailed evaluation are defined as either pretreatment or industrial effluent quality standards that meet the MISA exclusionary criteria and have had some success in practice.

2.2 Unique Descriptors for Control Options

In order to compare systems found in the various jurisdictions for the purpose of adaptation to Ontario, it was necessary to generalize the characteristics of the systems to a set of unique descriptors. The generalization was framed by a set of descriptors which covered the important features of a sewer use control program and the physical/economic milieu in which it was found. Table 2.1 lists these features.

A judgement was made on how each feature might be characterized using binary logic, e.g. the Regulation Setting Agency is either a senior level government or a junior level government. Similarly, a subjective judgement was made as to whether the feature was a major or minor descriptive feature in differentiating among options. A further judgement was made as to whether the regulator can affect the descriptor (proactive) or simply has to deal with an existing situation (reactive).

For these judgements, it became apparent that among the unique descriptors, the following could be considered most significant:

- Regulation Setting Agency
- Enforcement Agency
- Fiscal Controls/Incentives; and
- Legal System

These significant descriptors represent major elements in any consideration of how to regulate a societal activity. They are also features over which the regulator has a measure of control in terms of how the control program is structured. The remaining descriptors are generally not subject to control by the regulator. Some choice exists for the monitoring program but either type can be made effective. Physical facilities (sewage system infrastructure) could be changed although this is considered to be orders of magnitude more costly such that the regulator de facto has to work within the existing situation.

TABLE 2.1
SEWER USE CONTROL FEATURES

	Feature	Importance	Within Regulators Control
1.	Regulation Setting Agency - Junior/Province - Senior/Federal Level	Major	Yes
2.	Enforcement Agency - Junior/Local level - Senior/Province/State/Federal	Major	Yes
3.	Fiscal Controls/Incentives - Incentive, Economic Development Vehicle - Punitive, Non-discretionary, business cost	Major	Yes
4.	Legal System - Strict/Litigous - Flexible/Compromising	Major (Minor)*	Partially
5.	Monitoring Requirements - Frequent, long list - Compliance, site specific	Minor	Yes
6.	Physical Facilities - Separated Sewers, Secondary treatment or better - Combined sewers, primary treatment or less	Minor	No
7.	Industrial Base - Resource to primary - Secondary manufacturing to high tech.	Minor	No
8.	Physical Environment - Fresh water lake/river - Estuarine/marine	Minor	No

* Parenthesis indicates doubt or a matter of opinion.

2.3 Selection of Options for Detailed Evaluation

The control options studied were presented in overview in Section 1.4. The framework for generalizing the description of control options was described above. The identification of the options for further study is given in this section.

A summary of the logic in selecting eight options for detailed evaluation is given in Table 2.2. The first four options correspond to the existing programs that passed the screening evaluation carried out in the Phase I report. These are:

- U.S. option operating under a federal or state approved program, with municipal enforcement (PS-1);
- U.S. option operating under a federal program, with federal enforcement (PS-2);
- French option (PS-3); and
- West German option (IEQS-1).

The significant descriptors characterized these options using the terminology "senior", "junior", "cost", "incentive" and "strict" as discussed previously. The first important observation is that all the selected options that met the MISA exclusionary criteria operate under a "strict" legal system. Based on this observation, it was concluded that the only options recommended for detailed evaluation are those based on strictly applied sewer-use controls. As such, in developing hybrid options this significant descriptor is dropped as a variable.

TABLE 2.2
FEATURES OF SELECTED OPTIONS

TYPE OF STANDARD	DEFINITION	SIGNIFICANT DESCRIPTORS			
		Regulation Setter	Regulation Enforcer	Fiscal Policy	Legal System
	Existing Programs				
PS-1	U.S. - Federal or State Approved Program	Senior	Junior	Cost	Strict
PS-2	U.S. - Federally Approved Program	Senior	Senior	Cost	Strict
PS-3	France	Senior	Senior	Incentive	Strict
IEQS-1	Germany	Senior	Junior	Cost	Strict
	Hybrid PS				
PS-4		Senior	Junior	Incentive	n/a
PS-5		Junior	Junior	Cost	n/a
IEQS-2		Senior	Senior	Cost	n/a
IEQS-3		Senior	Junior	Incentive	n/a

n/a: All legal systems studies were "strict", therefore this subsidiary feature is not a variable for the hybrid system.

The hybrid options were generated by altering one significant descriptor from the four existing options. It was felt that by allowing only one significant descriptor to change, the hybrid control option would be a realistic extrapolation and would make detailed evaluation more plausible since existing program data (via the survey responses) could be applied.

It should be further noted that in developing hybrid options, the regulation setter was never a more junior level of government than the regulation enforcer (ruling out the junior regulation setter and senior enforcer option). These restrictions helped to focus the decision-making process on a more limited range of viable options.

3. OPTION EFFECTIVENESS EVALUATION

3.1 Introduction

An introduction to the option effectiveness evaluation process was provided in Section 1 and is summarized in Table 3.1 Section 3 will address steps 1 through 5. Steps 6 and 7 will be addressed in Sections 4 and 5.

Step 1 - The options are defined for the purpose of assessment. This is an extension of the discussion provided in Section 2 and involves the identification of the specific survey responses that correspond most closely to each option.

Step 2 - The effectiveness factors are broken down into sub-factors which correspond more directly with actual survey questions.

Step 3 - The options are assessed by factor as follows:

- the survey responses for each option are collected;
- the responses are summarized by sub-factor;
- conclusions are drawn regarding the strengths and weaknesses of the actual programs;
- judgement is used to determine what program changes would be required to better suit application to Ontario.

Step 4 - The options are ranked by factor. This involves a discussion of the relative differences between options. Desirable components are identified; options exhibiting many desirable components are more preferred.

TABLE 3.1
EFFECTIVENESS-COST APPROACH

Step 1 Fully define the options in terms of the data sources.

Step 2 Define evaluation effectiveness sub-factors that correspond more directly with specific survey responses (identify relevent questions).

Step 3 Assess the effectiveness of each option

- summarize relevant survey responses
- identify actual strengths and weaknesses of existing programs
- assess applicability of conclusions to Ontario

Step 4 Rank the effectiveness of each option by factor

- identify program components that are desirable
- specify which options contain the most desirable components
- order the options based on the relative overall desirability

Step 5 Effectiveness factor aggregation

- compare rankings by factor
- eliminate options that are less preferred by all factors
- discuss remaining options, identifying program components that are preferrable
- identify a preferred option

Step 6 Examine the costs associated with each program

- discuss possible adjustment of option ranking based on discussion of costs

Step 7 Identify the preferred option.

Step 5 - The individual rankings are aggregated and a preferred option based on overall effectiveness, is identified.

3.2 Option Definition (Step 1)

The eight sewer use control program options were defined in Section 2 based on the significant program descriptors. Here, the options are defined in terms of the appropriate questionnaire replies that fall under the various categories of effectiveness.

The representative programs surveyed for each option and the rationale for their identification with the option are given in Table 3.2. The first four options listed cover the existing programs in the United States, France and Germany. Thus, data from those countries can be directly applied. The remaining four options do not, however, correspond directly to any existing program and data was 'constructed' for these options. This construction attempts to utilize existing data where possible but requires sensitivity to those aspects of the programs which are unique. Where appropriate, survey responses are combined (e.g., the French incentive system was layered onto the German IEQS-1 structure to form option IEQS-3 since fiscal policy issues are effectively independent of other aspects of the program). Where this is not possible (due to a lack of data), or not reasonable (due to inconsistencies between programs), judgement must be applied to temper the survey responses.

TABLE 3.2
DATA SOURCES FOR OPTION ASSESSMENT AND RATIONALE

Option	Data Source	Rationale
PS-1	The five questionnaires completed in the U.S. (Buffalo, Milwaukee, Philadelphia, Chicago and Port Huron) are used. The USEPA and the two state questionnaire responses are used as background.	All the programs are based on pre-treatment standards with a senior level of government setting the regulation and junior level enforcement. Using several responses allows for the determination of the range of possible effectiveness.
PS-2	A single survey based on a case where the Federal government both sets and enforces the regulations (USEPA Region II).	A more limited data base of senior-senior pre-treatment experience but is representative of the possible effectiveness of PS-2.
PS-3	The two French municipal jurisdictions are used here. Other French data gathered is used as back up.	Only the French system has an incentive fiscal policy.
IEQS-1	The German municipal responses are used. Again, the state and national responses are used for back-up.	The German example was the only system surveyed which uses the IEQS system and, thus, is used as a representative case.
PS-4	The same surveys used for PS-1 are used here, combined with French data on certain fiscal aspects.	This hybrid system uses the data available but required judgement to combine responses.

Note: Refer to Table 2.2 for description of options

TABLE 3.2
DATA SOURCES FOR OPTION ASSESSMENT AND RATIONALE
(continued)

Option	Data Source	Rationale
PS-5	The same U.S. survey responses (municipal) used for PS-1 are applied here. Responses are combined with judgement regarding questions related to regulation setting implications.	This is similar to PS-4 except for the use of existing experience in Ontario (By-law system) regarding junior regulation setting.
IEQS-2	The German responses are used and combined with judgement on issues relating to regulation enforcement.	It did not seem reasonable to superimpose the U.S. or French senior enforcement experience onto the German due to the incompatibility of the basic systems. Thus, hypothetical judgement is used.
IEQS-3	The German municipal responses are used and combined with French experience related to fiscal policy.	It was deemed appropriate to apply the French data to the German IEQS system in this case since fiscal policy is effectively independent of regulation setting and enforcement.

Note: Refer to Table 2.2 for description of options

3.3 Sub-Factor Definition (Step 2)

The essential goal of the option effectiveness assessment process is to develop an overall statement of suitability (strengths and weaknesses) for each option based on the four major factors; technical, economic, legislative and organizational and administrative effectiveness. The first step is the collecting of survey responses as they apply to each factor. The definition of sub-factors helps to provide structure to that process. Survey responses were first summarized by sub-factors which were defined in a manner that made direct application of survey responses possible. The sub-factors are identified and defined in Table 3.3.

TABLE 3.3
SUB-FACTOR DEFINITION

Factor		Sub-Factor	Definition
Technical Effectiveness	T1	Water Quality Improvements	This attempts to measure the actual achievement of the programs in terms of reduction of the level of toxics entering the environment. Surrogate measure of improvement, where direct statistics are not available, are the existence of a water quality impact assessment program, how many factors are considered and how rigorously they are applied.
	T2	Intermedia Transfers	Sub-factor T1 reflects one aspect of the protection of the environment. T2 attempts to determine whether the transfer of pollutants to other media (e.g., air, through volatization or incineration of sludge, or soil through sludge disposal) occurs, and to what extent.
	T3	Industrial Compliance	High levels of compliance indicate that the objectives of the program are being attained.
	T4	Monitoring	This examines the extent of the monitoring program and the level of effort applied to monitoring. A program that has an extensive and regular monitoring program with well defined standards for such aspects as laboratory QA/QC and sampling protocols is likely to be more effective.

TABLE 3.3
SUB-FACTOR DEFINITION
(continued)

Factor		Sub-Factor	Definition
Technical Effectiveness (continued)	T5	Program Review and Updating	This examines the ability of the program to change technically. Circumstances where updating is desirable include analytical technology advances, new awareness of the impact of toxics, new treatment advances and changing economic circumstances.
	T6	Regulatory Comprehensiveness	Examines the length of the list of chemical parameters mandated to be examined. A more comprehensive list should normally imply a more effective program.
	T7	Analytical Feasibility	Examines the standards set in the program. It is not efficient to force industries/municipalities to meet standards below analytical detectability.
	T8	Regulation Basis	Identifies how the standards are set (e.g., based on BAT, tied to production, etc.). Strict standards that are a set in consistent and defensible manner which can be readily updated are most desirable.
Economic Effectiveness	E1	Efficiency	Efficiency measures the ability of industry and municipalities to achieve toxic loading reductions in the least costly manner possible.

TABLE 3.3
SUB-FACTOR DEFINITION
(continued)

Factor	Sub-Factor	Definition
Economic Effectiveness (continued)	E2 Cost effects on industry	This measures the relative (not absolute) burden that the costs of a program place on industry. It is most desirable that a preferred program have a marginal financial impact on industry.
	E3 Cost Effects on Municipalites	As for industries, this is meant to measure the relative impacts of the cost of the sewer use control program on municipalites.
	E4 Perceived Fairness	A stated objective of MISA is to be equitable (or even-handed) in regulation making and enforcement. This sub-factor measures the perceived economic fairness of a program.
	E5 Potential to Mitigate Costs	When economic fairness is difficult, or impossible to achieve, it would be desirable that mechanisms exist to relieve overstressed industries/municipalities.
Legislative Effectiveness	L1 Procedure leading to Prosecution	An effective, efficient process of prosecution leading in appropriate cases to conviction is essential so that the disincentive to avoid compliance is strong.

TABLE 3.3
SUB-FACTOR DEFINITION
(continued)

Factor	Sub-Factor	Definition
Legislative Effectiveness (continued)	L2 Ability to Prosecute	The degree to which the enforcement agency's ability to prosecute all violators is limited by exogenous factors (e.g., ability to obtain samples in a legal manner) should be identified to ensure that the necessary practical tools are available, where appropriate.
	L3 Success in Prosecution	If the legal nature of the program is such that the ability to convict violators is limited, then the disincentives to compliance are strengthened (i.e., industries/municipalites may judge the risk of non-compliance to be outweighed by the cost of compliance.).
	L4 Challenges to the law	Challenges to the substance of the laws or legality of the approach are recorded. Even if the present conviction rate is high, the presence of legal challenges may lead industries/municipalities to believe the program could be changed substantially.
	L5 Legal non-compliance	Mechanisms (such as control orders) that allow for industries/municipalites to circumvent legislated standards are recorded as a way of judging the importance of such administrative tools in the enforcement framework.

TABLE 3.3
SUB-FACTOR DEFINITION
(continued)

Factor	Sub-Factor	Definition
Legislative Effectiveness (continued)	L6 Time to Implement Program	The amount of time required to develop and properly implement a program is measured. While programs with a long lead-time may be perceived as being less effective in terms of dealing with the problem, a longer lead time may be required to put in place (and educate industry) a program that is, in the long run, the most effective.
	L7 Flexibility	Laws with little flexibility to change or those which require a long lead-time to change may be less effective in the sense of better being able to respond to changing circumstances.
	L8 Understandability	The effectiveness of the program is assessed through judgements made by program enforcers regarding the understandability of the program, in general, and the standards, in particular. Programs that are more generally understandable by those affected have a greater probability of goal achievement.
Administrative Effectiveness	A1 Enforcement Agency Resources (Where they are not municipal resources)	The ability of the enforcement agency to carry out its duty is assessed (i.e. the burden that the sewer use control program places on the agency in terms of increased need for manpower, training, etc.). Programs that require less administrative resources to achieve a given degree of abatement are preferred.

TABLE 3.3
SUB-FACTOR DEFINITION
(continued)

Factor	Sub-Factor	Definition
Administrative Effectiveness (continued)	A2 Municipal Resources (where they are part of the program)	The resources required for implementation, administration, monitoring and enforcement (where applicable) are measured. Also, any likely capital upgrading (e.g., STP upgrading) is considered. Programs with less burden on municipalities to achieve a given degree of abatement are preferred.
	A3 Lab Capability	The adequacy of industrial, municipal, commercial and provincial labs to meet the demands of the program in terms of facilities, equipment and personnel is assessed. Programs which ensure that lab capabilities are adequate and reliable are preferred.
	A4 Record Keeping Requirement	The level of data keeping requirements necessary to carry out the program is assessed. This also attempts to measure the communication burden placed on all participants in the process (industry, municipalities and higher levels of government). Programs with simplified communication requirements (limited record keeping) to achieve a given degree of abatement are preferred.

3.4 Option Effectiveness Assessment (Step 3)

The option assessments, by factor, are given in Appendix A. The assessments are arranged as four-column tables. The first column provides the collected survey responses, by sub-factor. The second column contains an overall summary of the survey responses for each factor (i.e., brings together all elements contained in the first column). The third column develops the program strengths and weaknesses. Finally, the fourth column discusses the applicability of the program to Ontario. The final two columns are summarized briefly, by option, in Sections 3.4.1 through 3.4.8.

3.4.1 Pretreatment Standard (PS-1)

Example: US - Federal or State Approved Program
Regulation Setter: Senior
Regulation Enforcer: Junior
Fiscal Policy: Cost
Legal System: Strict

The technical strengths of this option include a high level of industrial compliance. The program is comprehensive, having consistent standards for categorical industries. A high level of local government involvement has ensured achievement of program goals. The weaknesses relate to the difficulty in understanding categorical pre-treatment standards. Also, checking of self-monitoring may not be sufficiently rigorous as self-reporting may not be fully reliable (see Appendix A, pages A-1 and A-2).

The economic strengths include a significant effort directed towards ensuring that the program is perceived to be fair and justified. Little migration between States has been observed. Also, federal and state grants are available to help ensure that compliance is feasible. One significant weakness is the perception that the program is not uniformly enforced. There is some indication that industrial process alterations have resulted, which, in some cases may result in a decrease in one toxic discharge with a corresponding increase in another (for which additional sewer loading capacity is available). Also, there is some indication that industrial migration out of the country is occuring due to program costs (see pages A-3 through A-5).

The legislative strengths include satisfaction with the general enforcement/negotiations approach. Prosecution has been a successful fall-back where negotiated arrangements fail. The weaknesses include a long lead time to develop and implement local regulatory programs. Also, categorical pretreatment standards are considered too complex (see page A-6).

The principal administrative strength is that the senior/junior arrangement (regulation setter/enforcer) makes optimal use of existing capabilities without undue duplication. Also self-monitoring (by industry) reduces the administrative and monitoring load for the enforcement agency. However, there is a requirement for audit (compliance monitoring, sampling and inspection) and increased record-keeping by the regulator. Record-keeping requirements could tend to be somewhat excessive since different levels of government are involved (see pages A-7 and A-8).

3.4.2 Pretreatment Standard (PS-2)

Example: USEPA Region II
Regulation Setter: Senior
Regulation Enforcer: Senior
Fiscal Policy: Cost
Legal System: Strict

This option was assessed using a survey from the United States. Thus, it operates under the same federal program as those used to assess PS-1. Most of the comments regarding effectiveness are directly transferable. The major differences are discussed below.

Technically, fewer categories of industry are monitored (reflecting, primarily the uniqueness of the local situation). On aggregate, however, similar technical achievement to PS-1 has been realized (see page A-9).

The federally enforced system appears to have economic benefits for smaller regions due to economies of scale where the local administration would not be capable of carrying out responsibilities (see page A-10).

The legislative advantage results from a single level (senior) enforcement having significant experience with regard to prosecution and negotiation of "administrative orders" (see page A-11).

A significant administrative benefit is that the effectiveness is more uniformly achievable (not dependent on local resources). However, for larger regions, a duplication of an existing, capable, administrative structure would result (see page A-12).

3.4.3 Pretreatment Standard (PS-3)

Example: France
Regulation Setter: Senior
Regulation Enforcer: Senior
Fiscal Policy: Incentive
Legal System: Strict

The French system is a technically comprehensive and consistently applied program. Only senior level monitoring is legally mandated. However, the government typically delegates this responsibility to industry (self-monitoring) and ensures that it it is carried out through an audit function. If an industry is found to be "cheating" on the reporting of its self-monitoring data, the enforcement agency can apply more stringent limits as a penalty. Water quality assessments are required for treatment plants ensuring actual toxic loading reductions. The technical weaknesses stem primarily from the lack of local control. This is particularly evident for areas where infrequent federal monitoring results. Another major problem is that regulations tend to exhibit regional variability. Smaller industries also tend to not be well regulated (see page A-13).

An economic benefit to this option is that financial assistance and cost incentives are built into the program resulting in some mitigation of economic burden for both industries and municipalites. Sewer operators charge industries for sewer use based on a "pollution coefficient" and if any industry can show that actual pollutant levels (including toxics) are less than an industry-based standard, it will be charged less. Also, options for treatment are available (including STP upgrade) resulting in an efficient allocation of funds. Federal enforcement significantly reduces the cost burden on the local level of government. A weakness of the program is that the case-by-case approach for 'authorization' results in variability in the application of standards to individual industries (see pages A-14 through A-16).

The legislative effectiveness of this option is limited. The senior level of enforcement results in a labour intensive and lengthy prosecution process. Combined with a low fine structure, the disincentives to compliance are quite strong. A negotiated approach is used which leads in some instances to further delay in achieving compliance. Finally, the system is judged to be confusing and would be difficult to transfer to Ontario (see page A-17).

The administrative advantages accrue mainly to the local level of government, where few resources are required. A further benefit is that record keeping requirements are minimal, primarily due to the limited necessity for interaction between levels of government.

A major administrative weakness is that enforcement is regionally variable due to the different capabilities of the regional offices. Another major difficulty with this option is transferability to Ontario. France is more suited to local federal control since regional offices are already established for a range of other services. Provincial control locally in Ontario would require a good deal more incremental manpower and this would involve some duplication of effort, particularly with larger municipalities or regions which have already established staff and equipment for basic enforcement (see pages A-18 and A-19).

3.4.4 Pretreatment Standard (PS-4)

Example: Hybrid (U.S. Federal or State Approved Program With Incentives)
Regulation Setter: Senior
Regulation Enforcer: Junior
Fiscal Policy: Incentive
Legal System: Strict

The principal technical advantages of this hybrid option would be similar to those for PS-1. In addition, an incentive system could help to accelerate BAT development. The technical weakness relates to the difficulty in understanding categorical pretreatment standards (see page A-20).

The economic strengths would be similar to PS-1 with the added advantage that incentives can result in lower toxic loading while allowing industries to minimize their cost. Incentives involve cost relief which can be provided by government grants, low-interest loans, tax concessions, or fees and fines that don't recover all the costs incurred by government. The cost relief can be given irrespective of performance, or tied to an industry's performance in meeting or exceeding the abatement standards. Thus, option PS-4 has benefits considering efficiency (see page A-21).

The legislative effectiveness would be equivalent to option PS-1. The development of incentive based costing arrangements is independent of the legislative sub-factors examined (see page A-22).

The added administrative advantage of PS-4 compared to PS-1 is that incentives could increase voluntary compliance. Strong enforcement will still be required, but incentives could reduce the need for some enforcement agency resources (with regard to following up on violators). However an additional administrative burden for the enforcement agency could be required to administer the incentive aspect of the program (see page A-23).

3.4.5 Pretreatment Standard (PS-5)

Example: Hybrid
Regulation Setting: Junior
Regulation Enforcer: Junior
Fiscal Policy: Cost
Legal System: Strict

A major technical advantage to this option relates to the high level of local involvement in the entire process, thus, resulting in a higher degree of sensitivity to local needs/-requirements. The major disadvantages include local variabilities in standards due to either limited resources or local anomalies in terms of the industrial base. The local regulations could be 'soft' due to a municipality interest in maintaining industrial and economic growth. Finally, enforcement may be locally restrained due to similar concerns (see page A-24).

The differences, in terms of economic effectiveness, between PS-5 and PS-1, are a result of the increased local influence. Development of regulations by each municipality would involve considerable duplication of effort. Also, separate regulations may more readily result in real or perceived inequities (see page A-25).

The legislative strength results from the same level of government making and enforcing the regulations. A significant weakness, taken in the Ontario context, is that the experience at the municipal level is limited with regard to establishing sophisticated standards (see page A-26).

The additional administrative burden, at the local and provincial levels, would be significantly greater than for PS-1. This may be a particular burden for smaller municipalities which may be unable to easily incorporate this program into their structure. These difficulties could be mitigated through the province setting model guidelines and assisting in implementation (see page A-27).

3.4.6 Industrial Effluent Quality Standard (IEQS-1)
Example: West Germany
Regulation Setter: Senior
Regulation Enforcer: Junior
Fiscal Policy: Cost
Legal System: Strict

The German system is in a state of transition involving the incorporation of BAT standards. This change is also resulting in a move to a categorical pretreatment basis for their regulations implying that the PS approach is more compatible with the BAT concept. A significant technical weakness of the existing German program is that the regulations are not comprehensive, although they do have special programs for household toxics. A further weakness is that water quality impact assessments are not normally required. A difficulty, specific to the German environment, is that various environmental aspects (air, water, land) are regulated by different levels of government resulting in a greater likelihood of intermedia-transfers occuring (see page A-28).

Incentives have recently been introduced in Germany to reduce toxic discharges below current standards. This is considered to be a positive factor in the effectiveness of the program and may help to ensure speedy, compliance as Germany moves from "generally achievable technology" to "best achievable technology". The primary difference is that IEQS, which sets common standards for all industries (based on generally achieveable technology), provides little motivation for technological innovation in order to take advantage of economic incentives. Thus, the efficiency of the option is somewhat diminished (see pages A-29 through A-31).

The primary legislative effectiveness advantage is related to the understandability of IEQS standards. One clear set of regulations combined with one enforcement body significantly enhances the simplicity of the program. A related benefit is that protocols regarding sampling and testing can be clearly established (see page A-32).

The primary administrative advantage of this option is that a senior/junior system is utilized, minimizing duplication of effort and exploiting the administrative structure already in place. For similar reasons, record keeping and reporting requirements are not excessive. Monitoring is carried out predominantly by the public sector, increasing the administrative load (as opposed to a system where some self-monitoring is utilized) (see pages A-33 through A-35).

3.4.7 Industrial Effluent Quality Standard (IEQS-2)

Example: Hybrid
Regulation Setter: Senior
Regulation Enforcer: Senior
Fiscal Policy: Cost
Legal System: Strict

The technical effectiveness of this hybrid option would be very similar to the German system examined above. Given senior level regulation setting there is potential for a more consistent overall regulation of other possible environmental contaminants (see page A-36).

The economic effectiveness would be comparable to IEQS-1. In addition, senior government enforcement may be appropriate to ensure uniform enforcement of the regulations, particularly when considering smaller municipalities where economies of scale do not justify specialized local government staff (see page A-37).

The legislative effectiveness of this option would be similar to the German option (IEQS-1) (see page A-38). The administrative effectiveness is further constrained relative to IEQS-1 due to an increased duplication of effort (senior level enforcement requiring significant additional manpower and resources) (see page A-39).

3.4.8 Industrial Effluent Quality Standard (IEQS-3)

Example: Hybrid
Regulation Setter: Senior
Regulation Enforcer: Junior
Fiscal Policy: Incentive
Legal System: Strict

The technical effectiveness of this hybrid option would be comparable to the existing German experience (see page A-40). One additional advantage could result from a fully developed incentive system, which would accelerate the development of more stringent BAT levels approaching the level of "virtual elimination". The additional economic benefit of this system is related to the incentive structure (see page A-41).

The legislative effectiveness would be virtually equivalent to the existing German system (see page A-42). Administratively, this option benefits from the efficiencies resulting from a senior/junior framework (see page A-43).

3.5 Effectiveness Ranking by Technical Effectiveness (Step 4)

The assessments developed in the Section 3.4 form the basis for a comparative evaluation of options. This section through section 3.7 provide a discussion of the differences between options, and thus, the identification of a preferred option. The analysis with regard to each factor first examines the tradeoffs between critical program elements. From this examination, it is possible to identify options that contain most of the desirable elements.

The evaluation process for technical effectiveness takes place in two steps. First, the major features of a possible program are discussed and preferred elements for each feature are identified. These features include: effluent discharge basis, regulation setting agency, regulation enforcement agency and fiscal policy. Second, the desirable elements identified are used as a guide for overall option ranking.

a) PS versus IEQS for Effluent Discharge Basis

A pretreatment standard (PS) approach was previously defined as:

> ...a permissible concentration or mass emission of contaminant per unit of production specific to an industrial category and based on Best Available Technology (Economically Achievable), or BATEA.

The United States and French programs were shown to conform to the PS model.

An industrial effluent quality standard (IEQS) was defined as:

> ...a permissible concentration and mass emission of a contaminant for industry as a whole.

The existing German program was found to conform to the IEQS model, although since 1986 Germany has been moving towards a PS type program.

While PS and IEQS were convenient and appropriate labels to define the various existing programs, it is no longer appropriate to use such absolute terms as we develop a preferred system for Ontario which may have elements of both models. Indeed, all the existing programs fall somewhat between the two definitions. For example, the U.S. program has a list of contaminants for industry as a whole which account for toxic parameters from industries not falling into a category which has Categorial Pretreatment Standards (CPS) developed for it. As well, where water quality impact studies show that additional protection is required beyond that provided by CPS's and the limits for other toxic parameters, more stringent limits are applied.

In effect, what has happened in other jurisdictions is that the program has been developed from one or the other premise (PS or IEQS) and then been modified to allow the goal of toxic reduction to be most effectively met.

Strictly speaking, an IEQS based program would set limits which were independent of the type of industry and did not account for the size of the particular industrial facility or more importantly, the quantity of waste being discharged. A PS based program could account for both.

A disadvantage of either system could be that the mass loading of a particular contaminant from a large industry could have a significant impact. The fact that the POTW is also regulated may effectively prevent this occurence since the POTW, in turn, could more strictly regulate the industry through local limits based on water quality impact assessments.

The pretreatment standards (PS) approach seems to be preferable in the following areas:

- it results in effluent limits which are developed from the use of technology that is now available to industry. BAT goals are achievable;
- it provides limits based on industrial categories;
- it can recognize the scale of the industrial plant by allowing for production based effluent limits;
- it allows for higher gross reduction of toxics by achieving the "best" reduction for each industrial category, whereas IEQS is based on an "average" reduction by industry as a whole; and,
- it is similar to the apparently succcessful U.S. approach and the new direction being pursued in West Germany.

There are no areas where an IEQS approach would lead to a more viable sewer use control program.

b) Senior versus Junior Regulation Setting

In the Ontario context, senior refers to the Province and junior refers to "regional" or "local" municipal government.

Senior regulation setting is more effective in the following areas;

- Fairness and consistency by avoiding local variations and potential "softening" of regulations due to local political considerations.
- Updating and broadening of regulations to suit new technological developments, new chemicals and new industry types. It is not reasonable to expect local governments to keep abreast of changes in the many elements which affect the program.
- Intermedia Transfers can be better controlled if all relevant regulations are being developed by the same level of government. Provincial regulations already exist for air emissions and residuals disposal.

Senior regulation setting is the preferred approach from a technical effectiveness standpoint, although there is room for some locally developed regulations for sharing of allowable loading among industries or where more stringent controls on industry are required due to limitations in the receiving waterway.

c) Senior versus Junior Regulation Enforcement

Senior enforcement is more effective in the following area;

- The greater resources and experience of the senior level would be more likely to lead to success in prosecution.

Junior enforcement would probably be more effective in the following area;

- The monitoring programs could be more extensive through the use of local staff, rather than provincial staff.

The only example of a successful program with senior enforcement (PS-2) involved enforcement of a single regional program within an overall program which is largely enforced at the junior level (PS-1). There appears to be a preference indicated for junior enforcement as it relates to the expected efficiency of program delivery.

d) Cost versus Incentive for Fiscal Policy

The cost approach seems to offer the following advantages from a technical standpoint.

- Simple, easily understood penalties would also be seen as fair and not slow the rate of compliance as industry attempts to make changes.

In the French program, for example, "incentive" means a reward (in the form of a reduced annual fee) for producing an effluent which is of a higher quality than that required by regulation. The incentive is then an add-on to a cost approach where fines are also levied for failure to comply.

Based on this discussion of desirable program elements, the specific options are ranked as follows in terms of technical effectiveness:

PS-4
PS-1
PS-3 and IEQS-3
PS-2 and IEQS-1
PS-5 and IEQS-2

This ranking implies that the effluent discharge basis, regulation setter and regulation enforcer descriptors are considered of equal significance. Fiscal policy is considered to be less significant. (e.g. PS-1 only sacrifices the incentive system, whereas PS-3 sacrifices junior enforcement which is considered to be more important).

3.6 Effectiveness Ranking by Economic and Administative Effectiveness (Step 4)

The evaluation of options in terms of economic and administrative effectiveness was carried out jointly for two reasons:

- economic effectiveness and administrative effectiveness are closely interrelated;
- the relative performance of the options with respect to each of these factors is the same, reflecting this interrelationship.

The option which combines the best characteristics for each feature is, therefore, considered best overall.

a) PS versus IEQS for Effluent Discharge Basis

The widespread use of PS as a means of achieving BATEA reflects the fact that different "best technologies" are economically achievable for different industrial categories, and that a single standard for all industries (IEQS) would have to be less stringent overall than categorical pretreatment standards. This is because a single economically achievable standard for all industrial categories would have to be based on what is economically achievable for industrial sectors that have the most economic difficulty complying, while other industrial sectors could economically achieve higher standards.

Hence, the overall reduction in toxic discharges that would be economically achievable with PS would be higher than would be the case under IEQS. Alternatively to achieve the same overall reduction in toxic discharges, IEQS standards would have to be set at a level that could not be economically achieved by some industrial sectors, which could be expected to cause some sectors of Ontario's industrial base to close down or leave the Province.

It is also noted that, while the administration resources required for PS will likely be somewhat greater than for IEQS (reflecting the somewhat greater complexity of PS) the difference in effectiveness will almost certainly be greater still so that cost effectiveness will be higher for PS than for IEQS.

In light of the foregoing discussion, the PS approach is considered to be better in economic and administrative terms than IEQS.

b) Senior versus Junior Regulation Setting

There are sound economic and administrative reasons for having the senior level of government establish regulations.

Importantly, the preparation of regulations by each municipality would involve considerable duplication of effort in comparison to having one master set of regulations developed by the Province.

In addition, it is noted that uniformity in regulations is considered to be one of the key reasons why regulations are acceptable and workable. This was cited as a key factor in the perceived fairness of sewer use controls in the review of the jurisdictions.

In this context, it is noted that municipalities in Ontario may possess varying levels of ability and interest in preparing the necessary regulations, and the result of having each municipality prepare its own regulations may be that different levels of emphasis are given to regulation setting by different municipalities.

The formulation of regulations at a municipal level could be expected to impose a proportionately larger burden on smaller municipalities, since the cost of preparing regulations may not vary considerably from one municipality to another even though smaller municipalities have fewer financial resources.

Hence, regulation setting by the senior level of government is judged to be considerably more effective in economic and administrative terms. A master set of Provincial regulations would also eliminate the potential for real or perceived inequities in the stringency of regulations, and this is considered to be an important factor in the acceptability, workability and effectiveness of the program.

c) Senior versus Junior Regulation Enforcement

Of the three jurisdictions subjected to detailed review, one (Germany) had adopted junior level enforcement by the municipality; the second (France) had adopted senior level enforcement; and the third (U.S.) had adopted junior level enforcement with enforcement by the senior level of government as a back-up system in cases where the junior level of government is unable or unwilling to take on enforcement.

Regulation enforcement by the senior level of government (the French example) is appropriate for the French system of government, in which the national government has long established local offices. To be replicated in Ontario, the French program would require the Ministry to establish a considerable number of monitoring and enforcement teams (at considerable cost) since enforcement requires locally or regionally based staff and equipment to be effectively carried out. The establishment of such teams across Ontario would entail considerable duplication of costs since many of Ontario's municipalities (particularly the larger ones) have already established staff and equipment for basic enforcement activities.

Regulation enforcement by the junior level of government (the German example) would be appropriate in a number of the larger urban areas in Ontario, and particularly in areas where regional governments have been established. In these situations, municipalities have sufficient capability to properly carry out enforcement and, in many cases, have already established considerable staff and equipment for basic enforcement activities.

Moreover, economies of scale may justify the hiring of specialized staff and the purchase of specialized equipment in larger urban municipalities.

It is anticipated that the Ministry would still have to audit the enforcement efforts of municipalities to ensure that they are carried out uniformly across the Province, and this may involve some duplication of effort between municipalities and the Ministry. Nevertheless, such duplication of effort would likely be much less than that which would occur if the Ministry were to establish local Provincial monitoring teams across Ontario in a Provincial enforcement program.

It is noted that some difficulties may be encountered by smaller municipalities in a junior level enforcement program, since sufficient economies of scale may not exist in smaller urban areas to justify the use of specialized staff and equipment. In these cases, senior government enforcement would become more cost-effective as it would not duplicate municipal activities to the extent apparent in larger urban municipalites. Moreover, Provincial enforcement in a number of small municipalities may allow for collective economies of scale that could not be realized by the individual municipalities.

Based on this discussion, it is concluded that enforcement by the municipal level of government would be appropriate from an economic and administrative perspective for many areas of

Ontario. In situations where the municipality is unwilling or unable to enforce the program, the province should assume that role.

An important matter relating to enforcement is the relative distribution of enforcement costs between the Province, municipalities and industries. In some of the jurisdictions studied, municipalities effectively pass on all enforcement costs to industry (although financial assistance to industry is available from the senior government to help cover some of the costs). In other jurisdictions, municipalities do not pass on all their costs to industry.

The mechanism for municipalities to pass on costs to industry may be a factor in municipal acceptance of the MISA program. However it is noted that the programs examined in other jurisdictions are nation-wide and this has helped to prevent the migration of industry. Hence, if stringent standards are applied in Ontario, and not in other provinces, then some emigration of industries may occur. The appropriate distribution of costs between the Province, municipalities and industries may, therefore, become a crucial factor in the acceptability and workability of the MISA program. This matter is worthy of more detailed analysis before implementing MISA.

Two related matters include the role of self-monitoring by industry and the use of private commercial laboratories in monitoring. The U.S., German and French programs all make . use of industrial self-monitoring to some extent and the use of self-monitoring, with auditing by the enforcement agency may also be appropriate as a cost-effective approach in Ontario.

The U.S. and French programs also make use of commercial laboratories, with the most extensive use being made in France where commercial laboratories are effectively contracted as independent third parties to undertake both sampling and analysis in accordance with senior government standards.

The extent to which industrial self-monitoring and commercial laboratories are used in Ontario is worthy of further study with the intent of identifying a monitoring program that is most cost-effective in the Ontario situation.

d) Cost versus Incentive for Fiscal Policy

The alternatives under this heading are for a "cost" system which has industry bear all costs of the program (including the costs of administration, monitoring and enforcement as well as compliance) and an "incentive" system in which industry is relieved of some of these costs, thus reducing the disincentive that they present to industry.

In the United States, France and Germany, some form of cost relief is available, but the degree and the extent to which it is used as a strong incentive varies widely.

From the point of view of economic and administrative effectiveness, the experience indicates that an incentive system is clearly preferable to a straight cost system because it can speed up the implementation of the program, increase compliance, raise performance above the standards, encourage the development of better technologies, and reduce the resources required for administration, monitoring and enforcement. In short, while the level of enforcement is a key element, incentives can improve overall cost-effectiveness.

Thus an incentive type option is to be preferred. The extent and kind of incentives that should be incorporated in the Ontario system and the way the incentive program should be structured are matters that deserve further study, geared to the specific conditions in Ontario.

e) Preferred Option

Based on the preceeding evaluation, the best overall option from an economic and administrative perspective would combine the following features;

- pre-treatment standards;
- provincial regulation setting;
- municipal regulation enforcement with Provincial enforcement only where municipal enforcement is not appropriate; and,
- cost incentives to industry.

A review of the options indicates that Option PS-4 would best meet these requirements if it were modified to include an allowance for the alternative of Provincial enforcement to ensure uniform applications of regulations across the Province.

Other pretreatment standard based systems contain only some of the elements identified above. Given the above noted economic and administrative preferences, which are identical to the technical preferences, the options are ranked as follows:

- PS-4 with provincial fall-back
- PS-1
- PS-3 and IEQS-3
- PS-2 and IEQS-1
- PS-5 and IEQS-2

This reflects the descriptor significances as discussed for technical effectiveness.

3.7 Effectiveness Ranking by Legislative Effectiveness (Step 4)

With regard to legislative effectiveness, the critical program elements to consider are the level of government making the regulation and the level of government carrying out the enforcement. Based on the potential for mitigation, legislative effectiveness is considered to be effectively independent of the regulation basis and fiscal policy.

Ranking the options, in this case, based on legislative effectiveness, is not particularly helpful, since, in practice, the senior/junior distinctions made in the option definitions are not an accurate reflection of the legislative/regulatory/enforcement framework. The common thread in the apparently successful systems is that the senior level of government remains as the "fall back" or "baseline" in the system.

In only one option studied (PS-5) does a the 'junior' level make law (i.e., regulation) in isolation from a 'senior" legislative directive that sets a minimum regulatory standard. Even in the case studies, it is a municipal sewerage discharge by-law enacted by an upper-tier municipality (i.e., Regional, metropolitan or district municipality) of which there are only 13 in Ontario, not a lower-tier municipality (i.e., local or area municipality) of which there are over 800. On the other hand, where there is 'junior' enforcement in the U.S. context, there is a 'senior' level overview which could be invoked if the 'junior' level were ineffective. Only Germany appears to allow 'junior' level enforcement without 'senior' level overview. In Ontario, there is no 'senior' level enforcement of sewer by-laws but there is the overriding M.O.E. power to prosecute for the discharge of contaminants into the natural environment under the Environmental Protection Act and the Ontario Water Resources Act. That allows control over releases from sewage treatment plants and, quite indirectly, over some releases from industry.

The legislative effectiveness 'test' does not lend itself to the ranking of options in the traditional manner. The data does allow for the drawing of one important conclusion: the most satisfactory systems appear to be those where the making of the final regulations and their enforcement are coincident, whether senior/senior or junior/junior as defined in this analysis (i.e., including options PS-2, PS-3, PS-5 and IEQS-2).

The major weakness of a senior/senior system appears to be the frustration sometimes felt by the junior level at a lack of senior responsiveness to 'junior-identified' problems.

Operating close to the action, the junior level often feels it should have a significant role in the identification and implementation of enforcement strategies.

Having stated a slight preference for the same level regulation setting and enforcement, PS-1 and other similar based structures (e.g., PS-4) were found to be quite satisfactory provided political interference doesn't affect enforcement procedures (i.e., municipal reluctance to prosecute in order not to discourage new or existing industry) and provided there are sufficient financial resources to administer the program properly.

Lastly, to the extent that all jurisdictions studied rely heavily on administrative (i.e., 'orders to comply') rather than prosecutorial solutions, (i.e., charges, fines) the emphasis from a regulatory/enforcement perspective must be placed on the regulatory tools to achieve fair administrative solutions. This means legislative permission and the resources, at the appropriate political level, to carry out this kind of program, are required.

Given the above discussion, the options can be generally ranked as follows: PS-2, PS-3, PS-5 and IEQS-2 are effectively equivalent and are slightly preferred to PS-1, PS-4, IEQS-1 and IEQS-3.

3.9 Summary of Option Rankings

The ranking of options as identified above in the technical, economic and administrative, and legislative analyses is summarized in Table 3.4.

TABLE 3.4
SUMMARY OF OPTION RANKINGS

Technical Effectiveness	Economic and Administrative Effectiveness	Legislative Effectiveness
PS-4	PS-4 (with Provincial enforcement fall-back	PS-2, PS-3, PS-5, IEQS-2
PS-1	PS-1	PS-1, PS-4 IEQS-3, IEQS-1
PS-3, IEQS-3	PS-3, IEQS-3	
PS-2, IEQS-1	PS-2, IEQS-1	
PS-5, IEQS-2	PS-5,IEQS-2	

3.10 Overall Program Effectiveness (Step 5)

The technical and economic and administrative evaluations indicated a fairly strong preference for the pretreatment standard (PS) approach as opposed to the industrial effluent quality standard (IEQS) approach. These arguments were tempered by the fact that no 'pure' PS or IEQS system truly exists. Programs are either PS based, with some IEQS elements where appropriate, or IEQS based with some elements resembling PS. The conclusion reached was that the PS basis is preferred. The legislative evaluation indicated no relative preference for either effluent discharge basis. Thus, PS is the preferred overall approach considering all the effectiveness factors.

The technical and economic/administrative evaluations indicated a clear preference for 'senior' level regulation setting and 'junior' level enforcement (with 'senior' enforcement as a reasonable fall back option). The legislative evaluation indicated a slight preference for any option with the same level regulation setting and enforcement duties. It should be noted that the senior and junior definitions used during the legislative evaluation were somewhat modified to reflect the level at which the final regulation setting occurred.

An option that clearly satisfies all preferences is one where the senior level sets the regulations, the junior level is allowed to amend the substance of the regulations only if more stringent standards are required (as in the German and U.S. systems) and the junior level enforces the law, with the senior level in a 'fall-back' position. Based on the definitions provided in this analysis, the senior/junior arrangement (regulation setting, enforcement) would be most preferred. The senior/senior option could also be acceptable and would certainly be used as a fall-back.

The technical and economic/administrative evaluations indicated a clear preference for some sort of incentive based fiscal policy. The legislative evaluation indicated an indifference between methods in achieving legislative effectiveness.

Based on this discussion, the legislative effectiveness ranking can be manipulated so as to be consistent with the technical and economic/administrative rankings by altering the definition of the final regulation setter. Also, it should be noted that the legislative preference for senior/-senior or junior/junior arrangements over the senior/junior system is not strong and would be outweighed by the strong preference for senior/junior arrangements by technical and economic/adminstrative effectiveness.

Therefore, the overall option ranking is as follows:

1. PS-4 (with Provincial enforcement 'fall-back')
2. PS-1
3. PS-3 and IEQS-3
4. PS-2 and IEQS-1
5. PS-5 and IEQS-2

The following section discusses the implications of program costs on this ranking and thus allows for a final program recommendation. The specific elements required for that program are then defined. Issues which require further study for the efficient implementation of the sewer use control program are also identified.

4. PROGRAM COSTS

4.1 Introduction (Step 6)

The purpose of examining specific program costs is to address the issue of whether cost implications may modify the rankings developed in Section 3.6. Cost implications are considered in three steps. First, the possible cost difference between the PS and IEQS based systems are examined to determine whether the exclusion of IEQS options based on effectiveness grounds only is justified. Second, the possible cost implications of senior/senior versus senior/junior arrangements are addressed. Finally, the possible cost implications of an incentive-based system are assessed. The final two comparisons are carried out in a qualitative manner reflecting the limited data available from the surveys used. The first comparison uses limited cost data. The implications of costs are identified and discussed.

4.2 PS versus IEQS for Effluent Discharge Basis

It is possible that the administrative resources required for regulation setting and enforcement with a PS may be somewhat greater than for an IEQS, reflecting the somewhat greater complexity of the PS. However, as noted in Section 3.6 (a), the difference in effectiveness between a PS and an IEQS will almost certainly be greater still so that cost-effectiveness will be higher for PS than for IEQS.

The most substantial cost data gathered through the survey process comes from the United States (PS) and Germany(IEQS).

Cost data available for comparison come from three cities, two American (PS) and one German (IEQS). The West German city of Munich charges its industries DM 1.3 million/year for monitoring (sampling and analysis) and permits. This corresponds to approximately $750,000 U.S., which can be converted to $1,250 per industry (given 600 indirect discharges) or 60¢ per capita (given a population of 1,300,000).

The annual budget for the city of Chicago is $4866000, 80% of which goes toward monitoring of industrial discharges to municipal sewers and enforcement of regulations. Thus, the monitoring and enforcement cost is $3,900,000 per year, which can be converted to $10,000 per industry (386 indirect discharges) or 75¢ per capita (population of 5.1 million).

The annual budget for the City of Philadelphia is $1,040,000 of which 55% goes to monitoring, (not including lab costs) general administration, staff and facilities for issuing approvals and permits and record keeping and reporting to regulatory enforcement agencies. Thus, the monitoring related cost is $570,000 per year which can be converted to $4,300 per industry (134 industries) or 30¢ per capita (population of 2,000,000).

Although the costs are somewhat lower in the West German experience (IEQS), it should be recognized that additional costs are included in the U.S. estimates (including enforcement and general administration). Also, considering differences in the general industrial bases within these cities, a strict comparison of costs is not considered conclusive. However, the costs generated do indicate that monitoring related costs are not signficantly different.

Compliance costs for some industrial categories may be somewhat greater under P.S. than under IEQS, reflecting the fact that P.S. would be based on what is economically achievable for different industrial categories, and not on a single achievable standard for all industry (which would be based on what is achievable for the industrial categories having the most economic difficulty complying). However, because P.S. would be based on economic achievability, the potential for higher costs to industry is not considered to be unacceptable.

It is possible that more stringent standards in Ontario than in other Provinces could result in some emigration of industry. However, such emigration, if it were to occur would be a result of the MISA program in general (which has a goal of the virtual elimination of toxic discharges) and not of a particular effluent discharge basis.

Moreover, it is anticipated that the Ministry's future study program will examine the appropriate distribution of costs between the Province, municipalities and industries, and will consider appropriate incentives to mitigate any unacceptable economic impacts that may occur.

Therefore, given the limited data available and a qualitative discussion of possible cost implications, no unacceptable cost difference which may affect the ranking can be attributed to either of PS or IEQS based standards.

4.3 Senior versus Junior Regulation Enforcement Agency

Based on effectiveness arguments, the junior level of government was recommended as the preferred regulation enforcement agency. The cost related question is whether a senior enforcement arrangement would result in lower costs. In effect, this question was addressed in the effectiveness evaluation. The senior level enforcement option could result in duplication of operations, particularly with large municipalities (i.e., new regional staff and equipment would have to be established by the Province to deal with enforcement in some regions whereas the local municipal offices could have incorporated that duty into their existing mandate at only an incremental cost). Thus, the junior level of government would be the most cost-effective mechanism for enforcement.

For small municipalities, the senior arrangement may be less costly. The province could establish regional offices to monitor and enforce several small municipalities, thus exploiting economies of scale. This cost argument again is consistent with the effectiveness arguments made previously as the senior level enforcement option was recommended as a 'fall-back' where the local level is unable or unwilling to carry out this duty.

In sum, the cost arguments complement the effectiveness conclusions reached in the previous section.

4.4 Cost versus Incentive for Fiscal Policy

Again relying on the effectiveness arguments previously presented, it is reasonable to argue that an incentive based system would not result in greater overall system costs. In fact, in the long run costs may be less for this system since the incentives to innovate in order to achieve or exceed standards are in place. New, more economic, technologies and treatment processes are more likely to be developed.

In some areas, the incentive system includes Government subsidies for cost mitigation (reduction) which tend to understate the actual societal costs associated with discharging toxics. This could result in less process innovation since the true cost is not represented. However, this must be traded off against the potential costs to society of industries closing down or emigrating from Ontario as a result of the costs of the program. Other incentive systems can be structured so that non-compliers face costs substantially greater than they would face through a cost recovery system, whereas industries and municipalities in compliance would face reduced costs. This maintains the incentive to comply and innovate and simply acts as a cost allocation tool for industries/municipalities that do comply (shifts some cost to society which benefits from reduced toxic loadings).

In addition, a proper incentive program will act to encourage voluntary compliance which can be expected to reduce monitoring and enforcement requirements and costs in the long-run.

4.5 Conclusion

This cursory cost analysis does not include any significant impact on the options. There is, therefore, no basis for changing the option ranking identified in the option effectiveness evaluation.

5. RECOMMENDED PROGRAM

5.1 Introduction

The program effectiveness evaluation was carried out in Section 3 and resulted in a ranking of options. The cost analysis in Section 4 concluded that there is no basis, given the level of data available, to conclude that the effectiveness ranking should be altered. Therefore, the recommended sewer use control option corresponds to Option PS-4, allowing for 'senior' enforcement as the fall-back option. Broadly, this option is defined as follows:

- a categorical pre-treatment standard based on BATEA that also utilizes industrial effluent quality standards for a broad range of toxic parameters, (e.g. "priority pollutants");

- regulations are set by the senior level of government (province) with allowance for municipalities to set more stringent standards ("local limits") if desired provided they can demonstrate a need based, for example, on receiving water quality impact;

- regulations are to be enforced by local or regional municipalities (with Provincial auditing) except in those cases where the capability does not exist, in which case the Province will take on the role of enforcer.

- an incentive program is developed to encourage compliance and continued improvements in the effectiveness of MISA over time.

The remainder of this section defines this recommended option in more detail by addressing specific issues that the data allows for. This description provides the broad "blue-print" that should be followed in developing the sewer use control program. Given the nature of this study, it is not possible to address all aspects of the preferred option. Some additional elements which should be considered are noted in Section 5.3.

5.2 Specific Aspects of The Recommended Option

The analysis of the matters identified in the effectiveness evaluation permits the drawing of several conclusions regarding those features which are necessary for overall effectiveness of the recommended sewer use control option. These conclusions are presented under various headings below.

5.2.1 Basis for the Standards and their Development

The U.S. model for BAT development should generally be followed. Improvement in the involvement of industry and local government is essential to ease introduction of the concept and to make the regulations more understandable. A comprehensive education effort should be undertaken.

The number and nature of the industrial categories should be carefully selected. U.S. experience has shown that the efficiency of the program is affected by decisions in this area.

It seems logical to take into account pre-existing toxics in the water supply and to independently address the removal of these toxics from the water supply system under a separate program.

Water quality impact assessments should be required for the POTW permit and for permits related to new industries discharging to the sewer system which could affect POTW effluent quality.

5.2.2 Monitoring

- Monitoring should be set up using the U.S. model, including the 1/2 yearly audit and site inspection for industries. The concept of requiring a municipal official to be present when self-monitoring samples are taken is worth considering (Buffalo). The use of a computer program to follow self- monitoring report trends should also be reviewed.

- Legal access to the industrial site, well-defined sampling protocols, Provincial QA/QC standards and certification for laboratories are all key ingredients of a good program.

- Unannounced spot checks by municipal staff could also be used to check self monitoring industries. If a self monitoring industry is misrepresenting data a combination of increased self-monitoring, fines and surcharges could be introduced.

- Monitoring programs should be tailored to the industry and the toxicity of its effluent.

- The Munich program's use of a Nominated Water Protection Officer who is personally liable for the pre-treatment plant's performance provides an objective industry representative and could be an interesting self-monitoring control.

5.2.3. Regulation of Discharges to Other Media

Provincial regulations for air emissions and treatment residuals disposal need to be updated to account for the full range of toxics considered in pre-treatment regulations. As well, volatization of toxics at the POTW or in the sewer and leakage from the sewer system should be studied in more depth.

5.2.4 Household Toxics

A special program for household toxics (West German experience) would raise the level of public understanding and possibly result in a further reduction of toxic discharges to the sewer system.

5.2.5 Allowance for Industrial Cooperation

Although experience in the U.S. has not always been favourable, the Province should consider the benefits of a central industrial treatment facility for some waste streams. An example is a plant which serves New Jersey electroplating industries and is located in Connecticut. Mobile treatment systems may also provide a valuable service in certain cases.

5.2.6 Legislative Requirements

The required features for the achievement of legislative effectiveness, all else being equal, are as follows:

- Clearly written regulations, even where complex, are essential for effective implementation and enforcement;

- Layering of regulations (i.e., regulations at more than one jurisdictional level) should be avoided, if possible. Layering is acceptable only where it is intended as an enforceable senior level guideline to ensure junior level regulatory compliance;

- Extensive resources - human and financial - will be required to effectively introduce, educate, administer and, if necessary, prosecute;

- Standardized procedures, protocols and approaches are mandatory to avoid differential treatment and to ensure effectiveness in implementation and enforcement. Such a standardized approach should not be insensitive to the obvious need for education of smaller industries (e.g., electroplaters) who seem to require extra attention in this regard;

- The system should not permit discretion as to the rules/enforcement between municipal political boundaries;

- A full range of regulatory tools are required including: an effective administrative "order to comply" approach as an equal partner to the cruder tool of prosecution since the administrative tool is seen as the preferred approach for regulators;

- The potential of large fines and other penalties is essential for effective implementation;

- Re-opener clauses which allow modification and updating of the regulations would be useful since they could speed up the implementation of new regulations. Such clauses would obviate the requirement for public hearings and should only be used where a more strict or broader regulation is planned;

- A dynamic mechanism must be in place to update and modify regulations to allow the addition of new chemicals, improved treatment technologies and to address problems with existing legislation which may be slowing compliance or adversely affecting the viability of individual industrial plants.

5.3 Issues for Further Study

Numerous specific issues remain for the detailed development and implementation of sewer use controls in Ontario. In the course of carrying out this study, several further study issues required to more fully define the sewer-use control program have been identified by the specialist consultants and are summarized below.

5.3.1 Technical and Economic Issues

The following technical items need further examination:

- What constitutes "economically achievable" for BAT?

- How many industrial categories should be identified for BAT?

- What are the appropriate requirements for compliance monitoring?

- How should effluent limits be selected for other than categorial industries?

- What should be the appropriate guidelines for water quality impact assessment?

5.3.2 Economic and Financial Issues

The following economic related issues merit further examination:

- What will the additional costs likely be and what is the ability of Ontario's industries and municipalities to bear these costs? How do the cost structures of Ontario's industries compare with those in the other provinces and elsewhere? What are the impacts of industry passing on the cost?

- How should the total cost of the program be distributed among industry, the province, upper-tier municipalities and lower-tier municipalities. In particular, should greater relief be afforded to smaller industries since their compliance costs will likely be proportionately larger than for larger industries, based on economies of scale (as documented in the U.S. experience (3)? What budgets will be required in each case?

- What use should be made of incentives and penalties (i.e., the carrot and the stick)? What penalties should there be and how should they be enforced? What use should be made of government grants, loans, tax concessions and incentives and how should these be structured.

5.3.3 Administrative Issues

Five significant administrative issues merit further examination:

- How should responsibility for the program be assigned among the province, upper-tier municipalities, lower-tier municipalities, industry and commercial laboratories for monitoring (testing)?
- What reporting requirements should be established?
- What quality assurance, quality control measures should be taken?
- What time-table should be established for implementing the program and how should it be monitored?
- Is any administrative restructuring or reorganization necessary or desirable at the provincial or municipal levels?
- Since comprehensive standards could take years to develop, should interim standards be used, perhaps based on an improved model sewer-use by-law?

5.3.4 Legislative Issues

The present study provides a rough cut view of the legislative/regulatory issues involved in the sewer-use issue. Considerable attention should be given to the issues identified in Section 5.2.6. In particular, the legal/administrative relationship between the various levels of government in Ontario - Provincial, upper-tier municipal, lower-tier municipal must be closely analyzed in the context of the preferred option. Furthermore, the option recommended (and subsequently selected) must be more closely studied from a legislative enforcement view. The questionnaire approach permitted a satisfactory culling of options, but it did not result in the level of information that is essential to provide guidance on implementation in a legal/regulatory context.

One particular issue that will certainly require addressing is the needed changes to existing Provincial legislation. While the preferred option might be implemented with relatively little change to existing legislation, such as the EPA and the OWRA, some fundamental aspects of these laws should be examined given the program preferences identified in this report. For example, given that the MOE negotiates a compliance order with an industry and that industry complies with that order, if the performance meets this regulated standard the industry can still be prosecuted under the EPA because that industry might still be discharging a contaminant into the natural environment. There is a serious issue here as to whether this is fair and reasonable. This example merely highlights the possible incompatibility of "prosecution reliant" legislative approaches with approaches that utilize negotiated arrangements and incentive cost recovery approaches.

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APPENDIX A
OPTION EFFECTIVENESS ASSESSMENTS

OPTION PS-1

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G1 Technical Effectiveness				
T-1 Water Quality Improvements	- impact assessment part of state program for industry or POTW (federal government adding this requirement). - assessment usually by state or POTW - assimilative capability used to deny permit - studies show improved water quality		WEAKNESSES - categorical pre-treatment standards difficult to understand and amend - checking of self-monitoring industries may not be rigorous enough	- applicable to Ontario but need the following: - senior level to be province, not federal - develop CPS and BAT regulations which are more easily understood - better education/involvement of municipalities, industry and public - provincial standards for monitoring - long list of toxic parameters - non-CPS effluent limits required
T2 Intermedia Transfers	- comprehensive federal and state regulations cover water, air, land - federal regs pending on worker health and safety impact			
T3 Industrial Compliance	- effectively all CPS industries - all significant industries are regulated; majority are in compliance - small, low impact industries not regulated under PS standards (local limits apply) - 90% plus overall compliance	- comprehensive program - overall environmental impacts regulated - industrial compliance >90% - extensive monitoring program - major local government involvement		
T4 Monitoring	- comprehensive municipal and/or self monitoring - annual audit of Categorial Pre-treatment Standards (CPS) industries - duplicate sampling, statistical checks - consistent protocols, QA/QC - monitoring extent is industry specific	- periodic program update - wide range of toxic parameters regulated - measured improvement in water quality - industry, government and the public are involved in regulation setting - CPS industries under BAT; remaining are concentration based.	STRENGTHS - comprehensive, nation-wide, consistent standards for categorical industries - high level of local government involvement - all aspects of industrial pollution well regulated - water quality assessments required for permit	
T5 Program Review & Updating	- state/local flexible and regular update xith public input - federal regulations less amendable to change - re-opener clauses available which avoid public input - programs are dynamic			
T6 Regulatory Comprehensivness	- long list of toxic priority pollutants - on-going assessment of toxics - BAT on industry category basis - permits reviewed on basis of water quality impacts, parameters changed - no program for household toxics			
T7 Analytical Feasibility	- standards set at detectable levels - labs capable of meeting analytical requirements and volume			

OPTION PS-1
(continued)

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G1 Technical Effectiveness (continued)				
T8 Regulation Basis	- combination of industrial categorical (federal) and pollutant basis (local) - BAT for industry categories - POTW performance, sludge disposal and NPDES are considered - full public participation in developing regulations - 129 organics are considered - reviews standards every 5 years - pre-existing toxic allowance available - Philadelphia does not involve industry in regulation setting - Buffalo and Milwaukee have active industry committees involvement in regulation setting - removal credits disallowed - advanced POTW treatment allowed but CPS still required			

OPTION PS-1

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G2 Economic Effectiveness				
E1 Efficiency of the Program	- There is evidence that the program has resulted in water quality improvement. However there is some evidence that industries are altering their production processes so that they do not exceed sewer loading limits for one toxin but, in so doing, are increasing releases of other toxins for which additional sewer loading capacity is available (for example, switching from one solvent to another). - There are only limited incentives for industries or municipalities to reduce toxic discharges below those prescribed by the standards. Although federal regulations allow municipalities to surcharge industries for toxic discharges, none of the municipalities interviewed used such surcharges. However, New Jersey charges for permits on a varying scale ranging from $100 to $100,000 per year depending on the toxicity of discharges. This serves as an incentive to reduce toxic discharges in order to reduce permit costs. Similarly, although federal regulations allow for advanced treatment by municipalities, there is no incentive to do so since the federal government does not allow funding for oversized or overequipped municipal sewage treatment plants.	- The program has resulted in water quality improvements. However, there are very limited incentives for industries or municipalities to reduce toxic discharges below those prescribed by the standards. - The cost of compliance for industry is borne by industry. Municipal costs are offset to some extent by Federal and State grants and permit fees and fines (etc.)	STRENGTHS - The program has resulted in water quality improvements. - Federal and state grants are available to municipalities to help ensure compliance. - A great deal of effort has been directed at ensuring that the program is perceived to be fair and justified. - There is no evidence provided which would indicate that the program resulted in the migration of industries around the country.	- The U.S. standards are nationwide and this has helped to prevent migration of industry from one jurisdication to another to avoid the costs of compliance. However there is an indication that some industries are leaving the country. If the standards were applied only in Ontario, and not in other provinces, some migration of industries to areas outside the Province may occur. Provincial grants and/or loans to industry to aid industries in compliance may be worthy of consideration to account for this differencee between the U.S. and Ontario situations. - Unlike the French and German Programs, where municipnlities pass costs onto industries, U.S. municipalities bear some of the costs of enforcement.
	- One of the respondents suggested that self-reporting requirements for industry were not reliable and a number of municipal respondents felt that categorial pre-treatment standards were difficult to understand. This may place limits on the effectiveness of the program to some extent, particularly during the start-up period. - CPS's appear to be compatible with attaining BAT and recognize that different technologies are economically achieveable for different industrial categories which have different productions processes and effluent streams.	- A great deal of effort has been made to ensure that the program is perceived to be fair and justified. However, there is some perception that the program is not uniformly enforced, and that different standards relating to different receiving water bodies are somewhat inequitable.	WEAKNESSES - Categorial Pre-treatment standards require technical expertise to be understood, and generate a good deal of paperwork and associated administrative costs. This may have limited the effectiveness of the program to some extent, particularly during the start-up period. - There is some indication that self-reporting requirements for industry may be unreliable. - There is an indication that some industries are altering production processes so that they do not exceed sewer loading limits for one toxin but, in so doing, are increasing releases of other toxins for which additional loading capacity is available. - There is some perception that the program is not uniformly enforced and that different standards relating to different receiving water bodies are inequitable.	- However, in the U.S. example, federal and state grants are available to municipalities to help offset municipal costs of compliance. To be replicated in Ontario, the program would likely require that assistance equivalent to both U.S. federal and state grants be made available by the Province. - Ontario's industrial structure may vary considerably from that of the United States in terms of cost structure and competitive position in foreign markets. Hence the program may have different effects on Ontario's industry than was experienced in the U.S. It is anticipated that the Ministry's comprehensive economic analysis program will address such differences.
E2 Cost Effects on Industries	- Costs to industries include both capital and operating costs for pre-treatment facilities, increased administrative costs, and permit fees. In addition, it is noted that categorial pre-treatment standards require technical expertise to be properly understood and this may necessitate the hiring of technical staff or consultants. - There is some evidence that industries have had to change production processes to meet permit requirements but the surveys do not provide information on the effects this may have had on their cost structure. - All of the respondents believed that the program had not resulted in industrial migration around the country because the program is applied nationally. However, two respondents noted that there is some indication that industries are leaving the country because of the program.			

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
E3 Cost Effects on Municipalites	- Local governments require staff and budget for program implementation, administration, monitoring and enforcement (operating cost figures are discussed under Factor A2). - In addition, capital expenditures have been required for plant improvements. - It is believed that there are federal and state grants to municipalities to cover part of the costs of compliance although comprehensive information on grant programs was not supplied (discussed in more detail under Factor E5).		- There is an indication that some industries may be leaving the country to avoid the costs associated with the program.	- If municipalities are to bear some of the costs of compliance in Ontario, then provincial financial assistance may be crucial to help ensure uniform enforcement of the program since different municipalities have different financial capabilities. - the appropriate distribution of costs between the Province, municipalities and industries may become a crucial factor in the acceptability and workability of the MISA program in the unique Ontario situation.
E4 Perceived Fairness	- A great deal of effort has been made to help ensure that the program is perceived as being fair and justified. Some of the key aspects of the program are: - the program is nation-wide - all significant industrial dischargers are subjected to the regulations - all affected parties had opportunities for input before the regulations were enacted - industries have had the opportunity to challenge the categorial pre-treatment standards and the permit requirements and, as a result, the stringency of the standards has had to be justified by reliable data - detailed economic impact analyses were undertaken before promulgating the regulations - the EPA has a regulated deadline to respond to permit applications However, a number of the respondents perceived 2 inequities: - different standards are applied depending on the receiving water body - the different EPA regional offices place varying levels of emphasis on enforcement and the regulations are not enforced uniformly across the country.			- Regulation enforcement at the junior level would be appropriate in larger urban areas and, in particular, areas where regional governments have been established. Larger municipalities have sufficient capability to properly carry out enforcement and, in many cases, have already established considerable staff and equipment. - Economies of scale may also justify the hiring of specialty staff and equipment in larger urban areas. - It is anticipated that the MOE would still have to audit enforcement to ensure uniformity. - There may be some difficulties encountered by smaller municipalities in enforcement where economies of scale are insufficient to justify specialty staff and equipment. Provincial enforcement (PS-2) may be desired in those cases.
E5 Potential to Mitigate Costs	STATE COSTS - One state interviewed indicated that their Department of Environment Protection recovers all of its costs from permit fees and fines.			

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
	MUNICIPAL COSTS			
	- Federal regulations do not address the recovery of operating costs at municipal sewage treatment plants. Federal regulations allow municipalities to surcharge industries for toxic discharges but some state regulations do not permit surcharges for toxins and none of the municipalities surveyed make use of such charges. One of the states indicated that they provide operations and maintenance grants to municipal sewage treatment plants to help cover the costs of compliance with state regulations, and it is believed that federal grants are available to help cover capital costs, although comprehensive information on the grant structure was not supplied. In addition, municipalities can charge fees for permits, or contract with industries as the supplier of sewer services. Fines for non-compliance are also allowed.			
	INDUSTRY COSTS			
	- Federal regulations do not provide for cost sharing to help industries with the cost of compliance. However, one respondent indicated that a state bond fund has been established to help industries meet with compliance through small business loans. Although advanced treatment is permitted at municipal sewage treatment plants, industries must still meet categorial pre-treatment standards. Hence, advanced treatment by municipalities would not allow industries to reduce pre-treatment costs.			

OPTION PS-1

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G3 Legislative Effectiveness				
L1 Procedure Leading to Prosecution	- Standarized procedure required sampling techniques, verifiability of data, trained personnel (engineers, analysts, para-legal, etc). - Extensive resources required. - Directed at gross violators only. - May take a long time to complete prosecution.	- Need regulation and/or permit system that can be flexible. - Need standardized procedures, well trained personnel. - Long lead time to implement (including education of Industry/STP's) - Need compliance order/consent process as preferred alternative	- No observable weaknesses except: (1) criticism of CPS's. (2) municipality succeptible to compromise enforcement by desire to encourage industry. - All jurisdictions reported high degree of satisfaction with general enforcement/negotiation system.	- Conclude that a satisfactory system of the type identified in Factor Group Summary is implementable in Ontario. - Data insufficient to allow consideration of importance of senior level enforcement where junior level enforcement ineffective (key issue in US jurisdictions).
L2 Ability to Prosecute	- Not a problem provided items in L1 available. - Need significant fines. - Need right to sample on site. - Availability of certified labs is critical. - Availability of para-legal useful.	- Difficult to implement considering issues such as education, etc). - Difficult to manage (requires a significant amount of paperwork).	- Slow implementation of program	
L3 Success in Prosecution	- Provided items in L1 in place and some experience, success can be expected.			
L4 Challenges to the Law	- Not experienced once standards are set. - A few challenges to the permits and orders.			
L5 Legal Non-Compliance	- Compliance orders/administrative order are frequently used because of propensity to negotiate rather than go to court.			
L6 Time to Implement Program	- Time consuming to put necessary procedures in place. - Complicated - Several years to effect. - CPS's complex to understand/implement			
L7 Flexibility of the Legislation	- Statutes not flexible. - Regulations/permits are flexible.			
L8 Understandability of the Legislation	- education is an imperative - CPS's are difficult to understand - some jurisdictions recommend against CPS'S as not being worth the paperwork.			

OPTION PS-1

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G4 Administrative Effectiveness AI Enforcement Agency Resources	- The only figure available on enforcement agency resources is for New Jersey, with a staff of 120. - Enforcement staff, Administrative support staff, sampling equipment, vehicles and laboratory facilities are other necessry resources of an enforcement agency.	- The enforcement agency resources and municipal resources required to administer the program are considerable but they are generally felt to be reasonable compared to the results. This reflects the onus for self-monitoring and reporting placed on industries and the use of commercial labs, features, which shift much of the workload to the private sector.	STRENGTHS - It is a nation-wide system, so it is enforced by some level of government in every part of the U.S. - Lab resources within convenient distance have generally proven to be adequate. - It is a PS system which can best enforce BATEA for each type of toxic released (highest cost effectiveness). - Limited incentives encourage compliance and possibly reduce enforcement resources required. - some of the administrative COST is not passed on to industry but is absorbed by society, reflecting the fact that society benefits. This leaves industry more competitive and less likely to emigrate. - self-monitoring and commercial lab involvement reduces strain on enforcement agency resources. - It is a senior/junior system with senior government regulation setting to ensure uniform standards and junior government enforcement that makes good use of existing administrative capabilities at the junior level without duplicating them.	- The majority of Ontario industries are under a regional government with good capability for administering a program of this kind. - If enforcement is to be uniform, some municipalities may require provincial financial assistance to cover the extra administrative costs unless these are recovered from industrial permit fees and fines. - Lab resources within a convenient distance may not be sufficient in some parts of Ontario, and may have to be augmented.

OPTION PS-1

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
A2 Municipal Resources	- Staff sizes reported range from 3 (spending 50$ - 80$ of their time) in Port Huron (50,000 population) through 13 (presumably full-time) for Buffalo (500,000 pop.), 16 for Philadelphia (2,000,000 pop.) to 26 for Milwaukee (1,000,000 pop.) Chicago staff is not available (5,100,000 pop.) - Annual budgets reported range from $400,000 (Buffalo) through $1,040,000 (Philadelphia) to $4,860,000 (Chicago). The respondents considered these figures to be reasonable for the areas served. - Qualifications required range from union membership without special education, through "some college" and 2-year college degrees for technicians, to 4-year college degrees for engineers. Special training courses are given in all cases.	- Record-keeping and reporting requirements are sometimes considered excessive.	- U.S.E.P.A. requirements for Quality Assurance and Quality Control along with lab certification in the reporting states have apparently ensured reliability in the monitoring program. - Although several of the jurisdictions contacted indicated that record-keeping and reporting requirements were excessive, only one jurisdiction (Philadelphia) specifically indicated that it was a problem.	- Special certification of labs (municipal, commercial, institutional and industrial) may be necessary. - Record-keeping and reporting requirements should be streamlined so as to be no more onerous than necessary.
A3 Lab Capability	- Government labs, commercial labs and industrial labs are all used. Most industries are sampled by their publicly owned municipal treatent works labs, which may farm some work out to commercial labs. Other industries use commercial labs or their own labs. Many states require all the labs used to be certified.		WEAKNESSES - Self-monitoring, especially by smaller industries, appears to require more supervision. - While it is a nation-wide system, administrative effectiveness seems to vary among jurisdictions depending on their resources, although federal and state grand help to equalize the resources.	
A4 Record-Keeping Requirements	- Lab capability within a convenient distance now seems to be adequate in all the jurisdictions reporting, although there were some initial shortcomings while the program was getting under way. - Overall recordkeeping and reporting requirements are mandated by U.S.E.P.A., which required Quality Assurance and Quality Control data to support the reports. Industries which have Categorial Pretreatment Standards are required to be self-monitoring and reporting and must keep their own records. Some of the records are kept manually, some on computer, with a trend towards more computerization in some computers jurisdictions. - None of the respondents to the direct questions on recordkeeping raised it as a problem except Philadelphia which stated that Categorical Pretreatment Standards require excessive paperwork. However a number of other jurisdictions also indicated that recordkeeping and reporting is excessive and onerous in their replies to other questions, so this may be infact be more widely viewed as a problem.		- Not enough use is made of incentives. - Industries are not given the option of paying to upgrade the public treatment plant should that be more efficient than pretreatment by an industry. - Commercial labs would probably be more widely used, reducing the need for public resources. - Lab capabilities were initially inadequate in some areas.	

OPTION PS-2

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G1 Technical Effectiveness		- comprehensive program - overall environmental impacts regulated - 90% of program achieved - extensive monitoring program for metal finishing and plating - on-going program update - wide range of toxic parameters regulated - industry, public involved in reg. setting - pre-existing toxics allowance - regs based on BAT, BPT - Federal program since state promulgation slow - removal credits not allowed - central treatment facility proposed for platers - annual audit inspection - federal monitoring standards	STRENGTHS - comprehensive, nation-wide standards for categorical industries - all aspects of industrial pollution well regulated - annual audit inspection WEAKNESSES - WQIS is not yet part of permit	- Applicable to Ontario in similar way to PS-1, plus. - Use where junior enforcement inadequate.
T1 Water Quality Improvements	- WQIS soon to be part of permit - allocation on flow proportional basis - surcharges not used for toxics			
T2 Intermedia Transfers	- comprehensive federal & state regs. - federal regs pending on worker H&S impact			
T3 Industrial Compliance	- most industries still discharging to sewers - some small platers metal finishes closed, but due to off shore competition - 90% of program achieved			
T4 Monitoring	- monthly compliance Mon. for POTW - 6 month self monitoring for industry - state & POTW develop testing parameters & frequency - usually 24 hour composite flow prop. - annual audit/inspection - computer check of self monitoring			
T5 Program Review and Updating	- no re-opener clauses - amendable by congress or after public input - chemical list has on-going amendment and testing of new chemicals			
T6 Regulation Comprehensiveness	- federal stands for metals, organics, industry parameters of concern, other toxic organics, TTO			
T7 Analytical Feasibility	- standards set at detectable levels - labs capable of meeting analytical requirements and volume			
T8 Regulation Comprehensiveness	- combination of pollutant and industry based - based on BAT and BPT - units are either MG/L, production basis or pounds per day - pre-existing toxics allowance - Federal involved due to failure of state to implement own program - removal credits no longer allowed - advanced treatment allowed at POTW but CPS's still in effect - industry had a chance to comment before enactment - central facility proposed for plating wastes delayed compliance			

OPTION PS-2

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G2 Economic Effectiveness	.		- Refer to PS-1	- Comments relating to PS-1 are also relevant for PS-2
E1 Efficiency of the Program				- Regulation enforcement by the senior level of government in the U.S. example generally only occurs when the junior level of government has difficulty in developing or enforcing standards; senior enforcement in this case is therefore used as a back-up system to ensure that the regulations are adopted and enforced nationwide.
E2 Cost Effects on Industry				
E3 Cost Effects on Municipalities				
E4 Perceived Fairness				
E5 Potential to Mitigate Costs				- Provincial enforcement of regulations could serve a similar back-up role in Ontario, and may be particularly appropriate in smaller municipalities where economics of scale area are insufficient to justify specialized local government staff and equipment for enforcement.

OPTION PS-2

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G3 Legislative Effectiveness			STRENGTHS	
L1 Procedure Leading to Prosecution	- the steps involved are as follows: i) site inspections ii) audit and analysis iii) technical review; package prepared by investigators - cites violation - cites date - cites compliance schedule, if any - cites recommended civil penalty iv) package reviewed by several litigation levels moving up to Washington level to ensure uniformity of prosecution approach	- Sophisticated centralized approach. - Rely on ability to prosecute (and gain conviction) to back up administrative order which are the real enforcement tool	- One level (senior) enforcement means government can use the tools required; - sophisticated, experienced prosecution approach - experienced administration to educate and negotiate "administrative orders" WEAKNESSES - None noted	- Readily applicable to Ontario provided; - province removes municipal delegated authority to enact sewer discharge control by-laws - province gives itself the appropriate powers to control discharge by "administrative orders"
L2 Ability to Prosecute	- resources are available, when required - no prosecutions			
L3 Success in Prosecution	- rely on "administrative orders" as a first step - have found no need to go further - use "Definition of Significant Non-compliance" document rate seriousness of non-compliance based on economic benefit of non-compliance to the industries and seriousnesses of threat to human health and the environment			
L4 Challenges to the Law	- no loopholes			
L5 Legal non-Compliance	- administrative orders are relied on			
L6 Time to Implement program	- no comments (time to put in place regulators and administrative machinery, i.e., staff training, etc... - appears lenghty)			
L7 Flexibility of the Legislation	- no comments			
L8 Understandability of the Legislation	- complex regulations but good education provided by regulators (written material/knowledgible regulators)			

OPTION PS-2

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G4 Administrative Effectiveness			- Comments on PS-1 apply, PS-2 being the case referred to where the junior government is unwilling or unable to enforce properly and the senior government steps in to make sure that the job gets done. - One PS-1 comment that probably does not apply is that administrative effectiveness varies depending on resources; such variation would presumably be insignificant under PS-2.	- The province could step in if the municipal level is unwilling or unable to enforce properly, in the same way that PS-2 (senior/senior) steps in if the junior level is unwilling or unable to enforce properly under PS-1 (senior/junior) in the U.S. This is really a combined PS-1/PS-2 system, which should be quite applicable in Ontario. - However, a pure PS-2 system with all enforcement carried out by the province would not be suitable for Ontario because it would duplicate the excellent administrative capability which already exists at the municipal level, particularly in Ontario's regional governments.
A1 Enforcement Agency Resources				
A2 Municipal Resources				
A3 Lab Capabilities				
A4 Record-keeping Requirements				

OPTION PS-3

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G1 Technical Effectiveness				
T1 Water Quality Improvements	- Water quality assessments for direct industry and POTW's - 73% reduction industrial pollution of lower seine - federal government does W.Q. assessments	- comprehensive for major industries - overall environmental impacts regulated - smaller industries not well covered - lack of local power impedes monitoring and compliance - federal monitoring inadequate - regional disparities for other than I-C industries - 418 industry categories with BAT based limits - all affected parties participate in regulations	STRENGTHS - comprehensive, consistent program for major industries - tightened limits for cheating on self reporting - water quality assessments are required WEAKNESSES - lack of local powers - regional disparities - smaller industries not well regulated - monitoring not comprehensive - responsibilities for enforcement are dispersed - lack of coordination between government levels	- applicable to Ontario as per PS-2, plus; - develop appropriate incentive package.
T2 Intermedia Transfers	- Installation classe permit cover water, air and land impacts			
T3 Industrial Compliance	- all major industries regulated as installation classe - other industry less well covered - lack of local powers impedes effectiveness (pending new regulations)			
T4 Monitoring	- Only Federals have legal access - no local powers available - cheating on self-monitoring can lead to structure limits - protocols not well defined - federal monitoring infrequent			
T5 Program Review and Updating	- plan to unify complex multi-level regulations - Installation Classe regs are flexible on case-by-case - municipal regulations being updated			
T6 Regulation Conprehensiveness	- Installation classe regs have comprehensive case-by-case list - other industries much less comprehensive - regional variability			
T7 Analytical Feasibility	- government samples analysed at certified labs - no problem with permit levels			
T8 Regulation Basis	- regulations by 418 different industry categories - regulations are BAT based - concentration and min/mean loading basis - loading tied to production in some cases - all affected parties participate in public review - coury feel inadequate industrial participation - no pre-existing toxics allowance - some local adaption of installation classe limits			

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G2 Economic Effectiveness			STRENGTHS	
E1 Efficiency of the Program	- There have been noticeable improvements in water quality in some parts of France. - The program provides an incentive for industry to reduce toxic discharges below standards; sewer operators charge industries for sewer use based on a "pollution coefficient" and if an industry can show that actual pollutant levels (including toxins) are less than an industry-based standard, it will be charged less.	- The program has resulted in water quality improvements. - There are incentives for industry to reduce toxic discharges below those prescribed by standards. - The cost of compliance by industry is borne by industry, although senior government financial assistance is available to help meet costs of compliance.	- The program has resulted in water quality improvements. - Financial assistance is available to industries to help ensure compliance. - There is an incentive for industries to reduce toxic discharges below those prescribed by standards.	- The French program is applied nationally; hence if it were applied in Ontario, and not in other provinces, some emigration of industry might occur. - Unlike the U.S. example, where some of the costs of compliance are borne by municipalities, French municipalities pass on all costs.
	- In addition, it is noted that legislation allows for advanced treatement at municipal sewage treatment plants with a corresponding reduction in pre-treatment by an industry; however, the industry must pay in both cases for the special facility, and the quality of the effluent must be the same whether pre-treatment or advanced treatment is used.	- Municipal costs are passed on to industry. - A number of aspects of the program are directed at ensuring that it is perceived to be fair.	- "Authorisations" (permits) are quite detailed with respect to pre-treatment requirements; this may have helped to ensure that pre-treatment requirements are understood which may have had an positive impact on the effectiveness of the program.	- The French program provides federal financial assistance to industries to help meet compliance; provincial financial assistance to industries in Ontario would be required to replicate the French program in Ontario.
	- The use of advanced treatment at sewage treatment plants may allow industries to achieve economies of scale and associated cost savings in effluent treatment; although the municipalities surveyed had not made use of advanced treatment in their facilities, it is noted that a group of industries in the Rouen area constructed a collective treatment plant. - Permits ("authorizations") for industries to discharge are quite detailed with respect to the type of pre-treatment. - The P.S.'s appear to be compatible with achieving BAT.	- However, there is some potential for variation in the application of the regulations, and there is some perception that the program is not uniformly enforced across the country.	- Public hearings required as part of the application for "authorisation" help to ensure that all interested parties can make input into the application of regulations at the local level. - The program does not burden municipalities with additional costs. - There was no evidence provided which would indicate that the program had resulted in industrial migration.	
E2 Cost Effects on Industry	- Industries must pay capital and operating costs for pre-treatment (or advanced treatment) facilities. - In addition, municipalities recover the costs of operating sewage treatment plants through charges on industry which are based on levels of pollutants. - Industries are also required to pay for any repairs if their effluents cause damage to sewers. - Monitoring costs are also borne by industry either directly or indirectly through levies (discussed in more detail under Factors A1 and A2).			

OPTION PS-3

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T2 Intermedia Transfers	- installation classe permit cover water, air and land impacts			
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Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G2 Economic Effectiveness			STRENGTHS	
E1 Efficiency of the Program	- There have been noticeable improvements in water quality in some parts of France. - The program provides an incentive for industry to reduce toxic discharges below standards; sewer operators charge industries for sewer use based on a "pollution coefficient" and if an industry can show that actual pollutant levels (including toxins) are less than an industry-based standard, it will be charged less. - In addition, it is noted that legislation allows for advanced treatement at municipal sewage treatment plants with a corresponding reduction in pre-treatment by an industry; however, the industry must pay in both cases for the special facility, and the quality of the effluent must be the same whether pre-treatment or advanced treatment is used. - The use of advanced treatment at sewage treatment plants may allow industries to achieve economies of scale and associated cost savings in effluent treatment; although the municipalities surveyed had not made use of advanced treatment in their facilities, it is noted that a group of industries in the Rouen area constructed a collective treatment plant. - Permits ("authorizations") for industries to discharge are quite detailed with respect to the type of pre-treatment. - The P.S.'s appear to be compatible with achieving BAT.	- The program has resulted in water quality improvements. - There are incentives for industry to reduce toxic discharges below those prescribed by standards. - The cost of compliance by industry is borne by industry, although senior government financial assistance is available to help meet costs of compliance. - Municipal costs are passed on to industry. - A number of aspects of the program are directed at ensuring that it is perceived to be fair. - However, there is some potential for variation in the application of the regulations, and there is some perception that the program is not uniformly enforced across the country.	- The program has resulted in water quality improvements. - Financial assistance is available to industries to help ensure compliance. - There is an incentive for industries to reduce toxic discharges below those prescribed by standards. - "Authorisations" (permits) are quite detailed with respect to pre-treatment requirements; this may have helped to ensure that pre-treatment requirements are understood which may have had an positive impact on the effectiveness of the program. - Public hearings required as part of the application for "authorisation" help to ensure that all interested parties can make input into the application of regulations at the local level. - The program does not burden municipalities with additional costs. - There was no evidence provided which would indicate that the program had resulted in industrial migration.	- The French program is applied nationally; hence if it were applied in Ontario, and not in other provinces, some emigration of industry might occur. - Unlike the U.S. example, where some of the costs of compliance are borne by municipalities, French municipalities pass on all costs. - The French program provides federal financial assistance to industries to help meet compliance; provincial financial assistance to industries in Ontario would be required to replicate the French program in Ontario.
E2 Cost Effects on Industry	- Industries must pay capital and operating costs for pre-treatment (or advanced treatment) facilities. - In addition, municipalities recover the costs of operating sewage treatment plants through charges on industry which are based on levels of pollutants. - Industries are also required to pay for any repairs if their effluents cause damage to sewers. - Monitoring costs are also borne by industry either directly or indirectly through levies (discussed in more detail under Factors A1 and A2).			

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
	- Industries must also pay the costs of environmental impact studies prepared as a basis for their application for "authorisation" (permit). - Industries can also be fined for non-compliance, with fines as high as $1,000,000 FF. - The respondents believed that the program had not been a significant factor in the migration of industry around the country.		WEAKNESSES - There is some potential for variation in the application of standards to individual industries since standards are applied on case-by-case basis. - There is some potential for geographical variation in the application of standards to account for different local circumstances or differences in receiving water bodies.	- It is anticipated that the appropriate distribution of costs between the Province, municipalities and industries will be critical factor in the acceptability and workability of the program.
E3 Cost Effects on Munitipalities	- Local governments recover the cost of sewage treatment through charges on industry which are based on the levels of pollutants in industrial discharges (including toxins, BOD, COD, soluble salts and phosphorous). - The senior government through the Direction Regionale de l'Industrie et de la Recherche (DRIR) is responsible for monitoring and enforcement (with sampling and analysis paid for by industry). - Some municipalities devote no resources to sewer use control (e.g., the Rouen community); where municipal monitoring programs exist, the costs are borne either directly or indirectly by industry.		- The public hearing requirement for "authorisation", and the requirement for industry to pay for environmental impact studies to be submitted at pulbic hearings, places significant additional costs on industry compared to programs in the U.S. and Germany.	- The use of cost incentives in terms of reduced charges for industries with lower levels of toxic discharges is worthy of consideration in Ontario (incentives could encourage technological development to reduce costs and improve competitiveness).

E4
Perceived Fairness
	- A number of aspects of the program contribute to the perception of fairness:
	  - the program is nation-wide
	  - all industrial dischargers are subjected to the regulations
	  - the industrial sectors were consulted at a national level when the regulations were being formulated
	  - public hearings for "authorisations" (permits) allow all interested parties to make input into the application of regulations at a local level.
	- However, some aspects of the program may be perceived as inequitable:
	  - limit values for "authorisation" are imposed on industries on a case-by-case basis; hence there may be some variation on the application of national standards to individual industries
	  - local circumstances are taken into consideration when applying regulations at a local level and there is some perception of geographical variation in the application of standards
	  - different regional departments of the senior government place varying levels of emphasis on enforcement
	  - different standards can be applied to direct discharges depending on the receiving water body
			- There is some perception that the program is not uniformly enforced across the country.	- Senior level enforcement in France is appropriate to the French system of government in which the National Government has long established local offices). In Ontario, this system would require the MOE to establish local staff and equipment (at considerable cost).
				- Establishing local Provincial offices in Ontario may be duplicate cost since many larger municipalities have already established considerable staff and equipment.
				- Provincial government enforcement may be appropriate for smaller municipalities where economies of scale are insufficient to justify specialized municipal staff and equipment.

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
E5 Potential to Mitigate Costs	FEDERAL COSTS - DRIR only has limited staff and resources for program administration; there was no information provided as to how DRIR is financed. - Monitoring costs for sampling and analysis are paid either directly or indirectly by industries. MUNICIPAL COSTS - Municipalities recover costs through sewer fees and industry. - Where municipal monitoring programs exist, the costs are borne either directly or indirectly by industries. INDUSTRIAL COSTS - The cost of compliance by industry is borne by industry. - However, industries can seek financial help from the senior government through the 'gence Financiere de Bassin (details of such financial assistance were not provided). - In addition, if industries can show that their discharges are less polluted than the standard, they are entitled to lower municipal sewer use charges. - It is possible for industries to pay for special advanced treatment facilities at sewage treatment plants to achieve lower pre-treatment requirements; hence it may be possible for industries to achieve lower costs in their treatment programs in situations where advanced treatment is cheaper than pre-treatment or where significant economies of scale exist that would allow several industries to pay for collective advanced treatment facilities at a sewage treatment plant.			

OPTION PS-3

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G3 Legislative Effectiveness				
L1 Procedure Leading to Prosecution	- Senior enforcement lengthy; much manpower. - Lengthy process with a significant manpower requirement.	- Little reliance on prosecution; last resort. - Small fines/long, expensive prosecution. - prefer to negotiate - senior enforcement results in labour intensive, lengthy process	WEAKNESSES - No ability of local authority to enforce own contracts - dissatisfaction with national enforcement - system seems confusing and overlapping STRENGTHS - None identified but data not sufficient to properly analyze effectiveness of system.	- Not readily transferable to Ontario.
L2 Ability to Prosecute	- Local authority would welcome ability to prosecute.			
L3 Success in Prosecution	- Prosecutions rare, last resort. - Small fines (limited deterrent effect)			
L4 Challenges to the Law	- No answers.			
L5 Legal Non-Compliance	- Rely on negotiations but no power to implement.			
L6 Time to Implement Program	- No answers.			
L7 Flexibility of the Legislation	- No answers.			
L8 Understandability of Legislation	- large industries well informed - small industries slow to learn - clear statement of requirements essential to comprehension			

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G4 Administrative Effectiveness			STRENGTHS	
A1 Enforcement Agency Resources	- The DRIR resources devoted to enforcement are very limited. Sampling and analysis are paid for by industry and are carried out by government-designated independent commercial labs or, in the case of large industries, by the industry's own lab. - Lab services are costly, which can act as an incentive for quick compliance if DRIR orders frequent sampling of a polluting industry's effluent. - For few DRIR staff involved in enforcement are administrators and specialist technicians, engineers, and chemists (staff size is not given). - It is admitted that enforcement would be more effective with a somewhat larger DRIR staff.	- The enforcement agency resources and the municipal resources required to administer the program are minimal because monitoring is done by commercial labs or by the large industries themselves. Municipal administrative costs are recovered by municipal levies on industry. - Lab capability is adequate and is ensured by legislation. - Lab costs are high and paid by industry, giving an incentive for quick compliance if DRIR orders frequent monitoring.	- It is a nation-wide system and the national government is primarily responsible for enforcement, permitting consistent administration throughout the country. - Good use is made of incentives. - Enforcement agency resources and municipal resources required are kept to a minimum by giving commercial labs and the large industries responsibility for most of the monitoring.	- MOE could take on the role played by DRIR to ensure uniform enforcement or provincial standards throughout the province. - Municipalities desiring higher standards to meet special local circumstances could be empowered to adopt, enforce and levy for these, as in France. Ontario municipalities would appear to be more uniformly capable of this than French municipalities. - Lab certification would be required, and enough lab resources should be designated in each part of the province to meet local needs. This might require the creation of numerous new lab facilities.
A2 Municipal Resources	- In the Lyon urban community, the municipal staff and financial resources devoted to sewer use control are very small (staff size is not given). The more important industries are not regularly monitored. Monitoring costs are borne by industry, either directly or indirectly through levies. It is admitted that effectiveness could be increased with more staff and resources.	- Industries can choose between pre-treatment and upgrading the municipal treatment plant, as they pay the full cost either way.		
	- The Rouen urban community has not yet established any sewer use control regulations, so it devotes no municipal resources to such control at present. - Provided the same level of effluent treatment can be carried out by a municipal sewage treatment plant as by industrial pre-treatment, DRIR leaves the choice of method to the industry concerned, which must pay the full cost either way. This can result in an increase in municipal treatment resources at no cost to the municipality.	- There is no indication that record keeping and reporting requirements are considered excessive.	- Lab capability and reliability are ensured by government designation and requirements for Quality Assurance and Quality Control. - High lab costs, paid by industry, are an incentive for quick compliance. - Each industry can decide between pre-treatment and upgrading the municipal treatment plant, allowing the most efficient option to be selected in each case.	- Excessive lab fees should be prevented, either by designating enough labs to ensure competition or by establishing a standard fee scale.
A3 Lab Capability	- Sampling and analysis are done by government designated independent commercial labs, by the industry's own lab in the case of large industries, and by municipal labs operated by some communities. Lab capability is said to be adequate in all cases.			

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
A4 Recordkeeping Requirements	- Recordkeeping and reporting requirements vary by industry. Major industries, which usually discharge directly into receiving waters, are required to keep their own records of effluent quality and submit them to DRIR monthly. Other industries pay designated independent labs to sample, analyze and report their effluent quality to DRIR. Quality Assurance and Quality Control data are normally required to assure reliability. The only resources provided by DRIR are the trained personnel to inspect and record the submitted data and decide if any enforcement is necessary. - Industries are also monitored by municipal sewer authorities, the costs of sampling, reporting and recordkeeping being borne by the industries themselves, either directly or indirectly through municipal levies. - There is no indication that recordkeeping and reporting requirements are considered to be excessive.		- Recordkeeping and reporting requirements are not considered excessive, probably partly because some of the responsibilities have been assigned to commercial labs. WEAKNESSES - Industries bear, directly or indirectly, almost all of the costs for monitoring and administration in addition to all costs of compliance; this may make them less competitive (although there is no evidence that it has caused any to emigrate). - The level of enforcement evidently varies among regions and departments, even though it is a nation-wide system enforced by the national government. - The municipal role varies considerably among municipalities, adding to the above disparities. - The major role given to designated commercial labs may allow them to charge excessive prices. - There may be some duplication of existing capabilities if applied in Ontario. - Virtually all costs are passed on to industry (does not recognize societal benefits of reduced toxic loadings). This can have the effect of a regressive tax insofar as industry passes on costs to consumers in the prices of necessities, or it can make industry less competitive.	

OPTION PS-4

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G1 Technical Effectiveness			STRENGTHS	
T1 Water Quality Improvements			- financial incentive for industry to comply rapidly - industry could accelerate BAT development - comprehensive, nation-wide consistent standards for categorial industries - high level of local government involvement - all aspects of industrial pollution well regulated - water quality assessments required for permit - similar to PS-1 WEAKNESSES - categorical pre-treatment standards difficult to understand and amend - checking of self monitoring industries may not be rigorous enough	- Applicable to Ontario as per PS-1, plus; - develop appropriate incentive package.
T2 Intermedia Transfers				
T3 Industrial Compliance				
T4 Monitoring				
T5 Program Review and Updating				
T6 Regulation Comprehensiveness				
T7 Analytical Feasibility				
T8 Regulation Basis				

OPTION PS-4

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G2 Economic Effectiveness				
E1 Efficiency of the Program			- This option would have similar strengths and weaknesses as Option PS-1, with the following exeception.	- Comments relating to Option PS-1 are also relevant for Option PS-4
E2 Cost effects on Industry			- This option would also offer the additional strength of providing an incentive to industries to reduce toxic discharges below those prescribed by standards (an example of an incentive program is discussed in Option PS-3)	- In addition, it is noted that the use of incentives could encourage industries to develop better technologies over time as a means of reducing costs and becoming more competitive. Such incentives could act as a built-in mechanism to help ensure that the MISA program becomes more efficient over time
E3 Cost Effects on Municipalities				
E4 Perceived Fairness				
E5 Potential to Mitigate Cost Effects				

OPTION PS-4

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G3 Legislative Effectiveness			**STRENGTHS** - All jurisdictions reported high degree of satisfaction with the general enforcement/negotiation system. **WEAKNESSES** - no observable weaknesses except: - criticism of CPS's - municipalities susceptible to compromise enforcement by desire to encourage industry	- Conclude that a satisfactory system of this type is implementable in Ontario. - Data is insufficient to allow consideration of importance of senior level enforcement where junior level is ineffective (key issue in some jurisdictions)
L1 Procedure Leading to prosecution				
L2 Ability to prosecute				
L3 Success in Prosecution				
L4 Challenges to the Law				
L5 Legal non-compliance				
L6 Time to Implement Program				
L7 Flexibility of the legislation				
L8 Understandability of the legislation				

OPTION PS-4

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G4 Administrative Effectiveness			- The comments on PS-1 would apply except that full use would be made of incentives, which would increase voluntary compliance and reduce the need for enforcement agency resources.	- Incentives would be applicable in Ontario, and should improve administrative effectiveness and speed the implementation of the program.
A1 Enforcement Agency Resources				
A2 Municipal Resources				
A3 Lab apablulity				
A4 Recordkeeping Requirements				

OPTION PS-5

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G1 Technical Effectiveness			STRENGTHS - high level of local government involvement. WEAKNESSES - categorical pre-treatment standards difficult to understand and implement - checking of self monitoring industries may not be rigorous enough - possible local variabilities - possible 'soft' regulations - new industry standards not easily developed - fragmented overall environmental regulation	- Current Ontario system except BAT instead of IEQS.
T1 Water Quality Improvements				
T2 Intermedia Transfers				
T3 Industrial Compliance				
T4 Monitoring				
T5 Program Review and Updating				
T6 Regulation Comprehensivness				
T7 Analytical Feasibility				
T8 Regulation Basis				

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G2 Economic Effectiveness				
E1 Efficiency of the Program			- This option would have similar strengths and weaknesses as Option PS-1, with the following exceptions.	- A number of the comments made under PS-1 are also applicable here.
E2 Cost effects on Industry			- The development of regulations by each municipality would involve considerable duplication of effort in comparison to PS-1 (in which only one master set of regulations would be developed by the Province). This is considered to be a significant weakness in terms of the efficiency of this option.	- However, it is noted that one of the key reasons that PS-1 is considered to be acceptable and workable is that uniform regulations have been applied across the U.S. This is a key factor in the perceived fairness of the U.S. program, and was cited as a key reason why the program had not lead to the migration of industry around the country.
E3 Cost Effects on Municipalities				
E4 Perceived Fairness			- In addition, the preparation of separate regulations by each muncipality may result in real or perceived inequities in the stringency of regulations across the province.	- In this context, it is noted that municipalities in Ontario may possess varying levels of ability and interest in preparing the necessary regulations and the result may be that different levels of empahsis are given to regulation setting by different municipalities.
E5 Potential to Mitigate Cost Effects				- Hence, Option PS-5 could potentially eliminate 2 of the key strengths of Option Ps-1: uniformity and perceived fairness. - In addition, the PS-5 option may be considerably less efficient than the PS-1 option in that it would require each municipality to duplicate efforts in formulating regulations. - Moreover, the formulation of regulations at a municipal level can be expected to impose a proportionately larger burden on smaller municipalities, since the costs of formulating regulations may not vary significantly from one municipality to another, even though smaller municipalities have smaller tax bases. - Of course, the potential for inefficiency and inequity discussed above could be reduced somewhat if the Province were to prepare a set of guidelines for all municipalities to follow in setting regulations. However, this would effectively convert the PS-5 option into a form of PS-1.

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G3 Legislative Effectiveness				
L1 Procedure Leading to Prosecution	- No answer.	- Not sufficient data for useful conclusions.	- Not sufficient data for useful conclusions.	- Directly applicable to Ontario.
L2 Ability to Prosecution	- No answer.	- General Comment: where upper-tier municipality is experienced, with sufficient staff resources, prosecutions realize a high level of success.	WEAKNESSES - No experience at the municipal level to establish sophisticated standards.	
L3 Success in Prosecution	- High degree of success.			
L4 Challenges to the Law	- No answer.			
L5 Legal non-compliance	- Prosecution not primary enforcement tool. - Agreements, surcharges, program approvals, order to comply all preferred.		STRENGTHS - Some level of government that makes the regulation, enforces them.	
L6 Time to Implement Program	- No answer regarding timing. - Use of "deadline" system.			
L7 Flexibility of the Legislation	- No answer.			
L8 Understanding of Legislation	- No answer.			

OPTION PS-5

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G4 Administrative Effectiveness				
A1 Enforcement Agency Resources			- The comments on this option made above with regard to G2-Economic Effectiveness apply here as well.	- The comments on this option made above with regard to G2-Economic Effectiveness apply here as well.
A2 Municipal Resources			- From the administrative point of view, it is clearly not cost-effective for each jurisdiction at the junior level to develop its own regulations.	- Setting of regulations by municipalities is in effect the existing Ontario system, which has proved inadequate and led to the MISA program. The PS-5 option is clearly no longer suitable for Ontario.
A3 Lab Capability				
A4 Recordkeeping Requirements				

OPTION IEQS-1

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G1 Technical Effectiveness		- new program under development with BAT - multi level regulation for air water, land - impact assessment not normally required - special program for household toxics - 45 industrial categories are regulated to equipment of BAT	STRENGTHS - existing regulations effectively require BAT - special program for household toxics WEAKNESSES - divided responsibility for intermedia transfer of pollution - list of toxics are not comprehensive - water quality impact assessment not normally required	- applicable to Ontario with the following additions: - water quality impact assessment for POTW or new industry - comprehensive list of toxic parameters - province to regulate all industrial pollution - household toxic program - senior level to be Province - delegate to junior level only if resources adequate - provincial monitoring and analytical standards
T1 Water Quality Improvements	- W.Q. impact only required for highly toxic effluents - Newer industries more strictly regulated - New Program: No. W.Q. data - W.Q. assessment by state or local			
T2 Intermedia Transfers	- all environmental impacts are regulated but by different government levels			
T3 Industrial Compliance	- all industries, unless excluded (due to no problem) are regulated - permit issuance started - too early to assess compliance			
T4 Monitoring	- industry pays - comprehensiveness varies - federal sampling (lab standards) - legal access for local government - industry staff person legally liable			
T5 Program Review and Updating	- regulations are flexible and can be changed at any time - new permit if process changed or plant expanded			
T6 Regulation Comprhensiveness	- comprehensive parameters based on BAT (future) - current regulations not comprehensive - more toxic parameters being added - special household toxics program			
T7 Analytical Feasibility	- federal standards achieveable - lab capability varies			
T8 Regulation Basis	- changing to BAT based (1986 law) - concentration based limits exist for 45 industrial categories - industry was consulted for existing regulation but will not be for BAT standards - interim categorial standards by states to await BAT - current limits low enough to require BAT for most industry - pre-existing toxics not taken into consideration			

OPTION IEQS-1

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G2 Economic Effectiveness			STRENGTHS	
E1 Efficiency of the Program	- Significant improvements in water quality have been noticed in some areas (e.g., Munich) particularly with regard to heavy metals. - Until recently, there were only very limited incentives for industries or municipalities to reduce toxics below levels prescribed in guidelines; although extra charges to industry for toxics are permissible, they are not used by the municipalities surveyed, and higher charges are generally only used for strong effluents in terms of biodegradable compounds. - However, recent legislation (March 1987) allows states to levy charges to direct discharges (including municipal sewage treatment plants) based on C.O.D. and toxicity to fish; charges are halved if effluents are treated by generally achievable technology and only 20% if effluents are treated by best achievable technology (it is anticipated that municipalities may develop similar charging structures for industries); this may provide an incentive for municipalities and industries to reduce toxic discharges below those prescribed by standards. - The current standards appear to be somewhat easier to understand than the U.S. categorial pre-treatment standards, and were derived in consultation with industry, this may be a positive factor in the effectiveness of the program. - Current standards are based on "generally achievable technology" - New standards are being developed based on BATEA but more closely resemble a P.S. type system.	- Significant improvements in water quality have been noted in some areas. - Until recently, there were only very limited incentives for municipalities or industries to reduce toxic discharges below those prescribed by standards. - The cost for compliance by industry is borne by industry. - Municipalities pass operating costs on to industries. - State grants and loans are available to municipalities for upgrading sewage treatment plants. - Low-interest state loans are available to industry for up to 50% of the costs of compliance.	- The program has resulted in water quality improvements. - State grants and loans are available to municipalities to upgrade sewage treatment plants. - Low interest state loans are available to industry to help ensure compliance. - Standards are now being strengthened with the view of developing best achievable technology. - Recent legislation creates an incentive to reduce toxic discharges below those prescribed by current standards. - Current standards appear to be somewhat easier to understand than U.S. categorial pre-treatment standards.	- As in the case in the U.S. and France, the German program is applied nation-wide (although some municipalities currently have more stringent standards than others, it is anticipated that new standards will effectively eliminate these disparities). - Hence, if the program were applied in Ontario and not in other provinces, some emigration of industries might occur. - Provincial grants or loans to industries to assist in compliance may be worthy of consideration to account for this difference in the German and Ontario situations. - In this regard, the use of low-interest state loans to industry in Germany may be worth more serious investigation to determine whether a similar program might be applicable in Ontario.
			WEAKNESSES	
E2 Cost Effects on Industries	- Although there are not specific industrial pre-treatment standards, many industries have had to install some pre-treatment facilities to meet permit requirements for effluent quality, and this entails capital and operating costs. - Industries must also pay permit fees, and municipalities cover sewage treatment costs with waste water charges to industry based on the volume of the discharge. - Industries are responsible for self-monitoring costs and in Munich, municipal monitoring costs are also billed to industry (600 industries pay about D.M. 1.3 million/year for monitoring). - Changes in production processes have been noted for some industries but the surveys do not provide information on the effect this may have had on cost structures.	- It would appear that less effort is being spent than in the U.S. to ensure that the program is perceived as being fair and justified.	- Existing standards are not based on best achievable technology. - Some industries have closed down or moved, but it is not known whether this was a result of the program or other economic considerations. - Industries are not being allowed to provide input into the formulation of new standards based on best achievable technology. - It is uncertain what effects new standards may have on industry or the economy as economic impact analysis are not being carried out.	- Similarly, the use of a charging structure with significant discounts for dischargers using BAT may also be worthy of consideration, particularly during the implementation stage of MISA, as this may help encourage speedy compliance. - The ability of municipalities to pass on costs of the program to industries may be a significant factor in the acceptance of the program by municipalities in Germany.

OPTION IEQS-1
(continued)

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
	- It is noted that some industries have ceased operations or moved but it is not known whether this is as a result of costs of the program or of other economic factors. - Industries can also be fined and, as a last resort, some industries have been closed down for non-compliance (the municipality is allowed to seal off sewer connections as a last resort for non-compliance).		- Municipalities do not have a regulated time to respond to permit applications.	- It is anticipated that the appropriate distribution of costs between the Province, municipalities and industries in Ontario will be subjected to more detailed study. - It is worthy noting that Germany is moving toward P.S. as a means of achieving BATEA.
E3 Cost Effects on Municipalities	- Local governments require staff and budget for implementation, administration, monitoring and enforcement (operating cost figures are discussed under Factor A)2. - Some upgrading of sewage treatment plants may also be required. - However, operating costs are offset by waste water charges to industry and permit fees and, in the case of Munich, the municipality bills industries directly for municipal monitoring charges (standard sampling fees are utilized and range in cost depending on the number of parameters analyzed). - New legislation (March 1987) allows the state to levy charges to direct discharges (including municipal sewage treatment plants) based on C.O.D. and toxicity to fish; it is anticipated, however, that these charges will be passed through to industry via higher waste water charges, permit fees, etc.			
E4 Perceived Fairness	- A number of factors were identified which contribute to the perceived fairness of the program: - current standards for generally achievable technology were defined with the active participation of industry - current guidelines have generally been adopted across the country, and future regulations will be nation-wide - regulations are concentration-based an apply equally to all industries - However, compared to the U.S. example (options PS-1 and PS-2), there has not been as much effort directed at ensuring that the program is perceived to be fair and equitable:			

OPTION IEQS-1
(continued)

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
	- Industries are not involved in determining best achievable technology for the new standards, although they will be allowed to comment after best achievable technology is defined - although existing guidelines are generally adopted throughout the country, some municipalities have adopted more stringent guidelines (it is anticipated, however, that such disparities will be eliminated once the new national standards are adopted). - detailed economic impact analysis are not being undertaken as a part of the formulation of new standards - there is no regulated deadline for municipalities to respond to permit applications			
E5 Potential to Mitigate Costs	STATE COSTS - Recent legislation allows states to levy charges on direct discharges (including municipal sewage treatment plants) based on C.O.D. and toxicity to fish; such charges are used to cover state costs and to provide loans or grants for upgrading sewage treatment facilities. MUNICIPAL COSTS - Municipalities offset operating costs through waste water charges to industries in addition to charging industries for permit fees and in some cases, monitoring fees. - In addition, charges levied by states on direct discharges can be used to provide loans or grants for upgrading sewage treatment plants. INDUSTRY COSTS - The cost of compliance for industry is borne by industry. - However, it is noted that one state (Bavaria) provides loans to industry to cover up to 50% of the costs of compliance at interest rates which are 5% below the standard commercial rate. - It is anticipated that municipalities may adopt charges for industry similar to the recently legislated state charges on direct dischargers (i.e., charges would be halved if effluent is treated by generally achievable technology and would only be 20% if treated by best achievable technology); this would allow industry to recover some of the costs of pre-treatment facilities through smaller payments to municipalities. - Although advanced treatment at municipal sewage treatment plants is not prohobited, it is not practiced in Germany; hence, a corresponding reduction in pre-treatment by industries is not possible.			

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G3 Legislative Effectiveness				
L1 Procedure Leading to Prosecution	- Need strict monitoring and right to sample without warning. - No layering of laws.	- Right to sampling without warning. - One set of standards to apply. - Strict monitoring. - Clear protocol regarding sampling, testing, etc. - Negotiations preferred to prosecution.	STRENGTHS - One set of clear regulations. - One enforcement body. - Can establish clear protocols. - Can manage public education. WEAKNESSES - Slow implementation (but all such programs seem to require long "education" periods).	- Requires delegation of final sewer by-law regulation making and enforcement authority to municipality. - Province could still set standards regarding release from STP and prosecute defaults. - Requires amendments to allow province to set standards that would provide base line for municipal by-law.
L2 Ability to Prosecute	- Need standards for sampling, testing etc. - Low fines and/or legal right to seal pipe.			
L3 Success in Prosecution	- Proof difficult. - Few prosecutions. - Last resort. - Prefer negotiations.			
L4 Challenges to the Law	- No.			
L5 Legal Non-Compliance	- None possible.			
L6 Time to Implement Program	- Slow lead time, implementation. - Quite flexible law (regulations can be charged at any time).			
L7 Flexibility of the Legislation	- "BAT" flexible however once BAT, is set, law is difficult to change.			
L8 Understandability of legislation	- Larger companies understand well. - Smaller companies slow to learn. - Once comprehend, easy to follow since "limits" set.			

OPTION IEQS-1
(continued)

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G4 Administrative Effectiveness			STRENGTHS	
A4 Administrative Effectiveness	- Bavaria spends approximately DM 20,000,000 per year on monitoring and enforcement. The amount spent by Nordrhein-Westfalia was not reported. - Neither state supplied any figures on the size of staff or other resources devoted to monitoring and enforcement. Bavaria indicated that the staff engaged in technical enforcement are mainly chemists and those engaged in legal enforcement are mainly lawyers and engineers. - Enforcement costs are evidently entirely recovered from industry, partly through wastewater discharge fees that are paid by direct dischargers including municipal sewage treatment plants, which pass them on to indirect dischargers; partly through fines, which can range up to DM 100,000; and partly through legal enforcement costs of DM 500 per expert report, paid by non-complying industries.	- The enforcement agency resources and municipal resources required are significant at present and will have to be increased to properly implement the new regulations that are being developed. These resources seem to be regarded as reasonable in view of the program. - The costs of the program are essentially borne by industry, not out of taxes. - Overall lab capacity seems to be just adequate and will need to be expanded under the new regulations.	- It is a nation-wide system - It is a senior/junior system in which the Federal Government and the States set the standards and the control of indirect discharges is delegated to the municipal or local level. This makes good use of existing administrative capabilities avoiding duplication. - Enforcement seems to be fairly uniform and should become more so under new regulations. - New regulations will involve significant incentives by reducing fees to 20% if BAT is used. - The states can provide tax incentives and low interest loans to help industries meet the requirements.	- The German approach with the province controlling all direct discharges and delegating control of indirect discharges to municipalities would seem to be easily adaptable to Ontario. - Provincial and municipal lab facilities would probably have to be significantly augmented unless more use was made of self-monitoring and/or commercial labs than in the German system. - Shifting all administration costs to industry as well as all compliance costs might make some Ontario industries uncompetitive with those in other provinces, as it would not be a nation-wide system.
	- Both states delegate the responsibility for monitoring and control of indirect discharges to the municipalities/district offices or the lowest water authorities. Self-monitoring by industries is also required. - The state has its own lab which handles sophisticated analyses that couldn't be done as well in municipal labs. The state lab may also handle an overload from a municipal lab. - The state may also provide tax incentives and low interest loans (financed out of wastewater discharge fee receipts) to assist direct and indirect dischargers in meeting the regulations.	- There is no indication that recordkeeping and reporting requirements are considered excessive.	- Recordkeeping and reporting requirements are not considered excessive. WEAKNESSES	
A2 Municipal Resources	- Munich (population 1,300,000) has a staff of 20-25 for the control of approximately 650 dischages. - Dusseldorf (population 500,000) has a staff of 5 for sampling/analysis and 5 for issuing permits, with some 300-500 "interesting" discharges. It is planned to initially double these staffs to a total of 20 for enforcement of the new regulations 4 of the 20 will handle permits for pre-treatment plants.		- Present staff resources and lab capacity are not sufficient to properly implement the new regulations that are being developed. - It is presently an IEQS system which cannot enforce BATEA for each type of toxic waste.	

OPTION IEQS-1
(continued)

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
	- Munich has an annual budget of DM 1,300,000 for monitoring. Virtually all of this is recovered from industry thorugh permit fees, sampling/analysis fees (which vary with the number of parameters in the analysis), and surcharges for especially difficult substances. The net municipal contribution is therefore very small. No budget data was provided for Dusseldorf but it was noted that industry pays DM 50-2000 for a permit depending on the investment cost of pre-treatment. This usually does not cover the cost of issuing the permit.		- Virtually all costs are passed on to industry. This can be regressive assuming industry pases on the cost through the price of their goods, or it could make industry uncompetitive (more likely to emigrate).	
	- The Munich staff includes civil engineers, mechanical engineers, a biologist, an industrial chemist, lab technicians, and samplers. Lawyers are available from another department if needed. No special training programs are provided.		- Self-monitoring is not used as vell or as widely as it might be leaving more monitoring cost to be borne by govenment.	
	- The Dusseldorf staff is mainly engineers (from engineers schools, not universities) plus civil servants with university degrees and special training in legal aspects and administration. The staff includes environmental engineers, civil engineers, chemical engineers, drainage engineers, industrial chemists, chemical technicians, and lab assistants. Training is provided on the job, with no special training programs.		- Very little use is made of commerical labs, leaving more costs to be borne by government. - Industries are not given the option of paying to upgrade the public treatment plant should there be cases that it is more cost-effective then carrying out pretreatment.	
A3 Lab Capability	- Each state has its own lab, at noted above. - Munich has a central lab which was recently expanded, and 4 mobile sampling/analysis labs. Excess samples and ones requiring sophisticated analysis are sent to the state lab. - Dusseldorf has its own lab with good equipment, though it has problems analyzing some organic compounds. It does not yet have the capacity to handle the large number of samples that will be required to properly implement the new regulations. - Little of any use seems to be made of commercial labs. - The overall capacity of state and municipal labs thus seems to be just adequate under present regulations, and it will need to be expanded under the new regulations unless use is made of commercial or institutional labs. This should not affect public costs, as industry will be charged for whatever is needed.			

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
A4 Recordkeeping Requirements	- Self-monitoring results must be submitted regularly by industries and are sent by mail. Not all industries are required to self-monitor. Much of the self-monitoring seems to be mainly for educational purposes or just as backup for the state and municipal monitoring. - In Bavaria, state control records are computerized but self-monitoring records received from industry are not. The practice in Nordrhein-Westfalia was not reported. - In Munich and Dusseldorf the municipal control records are computerized but self-monitoring records received from industry are not. - There is no indication that recordkeeping and reporting requirements are felt to be excessive. - Samples are analyzed following DIN standards and procedures. Special Quality Assurance and Quality Control data are apparently not required.			

OPTION IEQS-2

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G1 Technical Effectiveness				
T1 Water Quality Improvements			STRENGTHS - more consistent overall environmental regulation than IEQS-1 - special program for household toxics WEAKNESSES - list of toxics not comprehensive - water quality impact assessment not normally required - senior level enforcement not efficient	- applicable to Ontario as per IEQS-1, plus: - no delegation to junior level
T2 Intermedia Transfers				
T3 Industrial Compliance				
T4 Monitoring				
T5 Program Review and Updating				
T6 Regulation Comprehensiveness				
T7 Analytical Feasibility				
T8 Regulation Basis				

OPTION IEQS-2

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G2 Economic Effectiveness				
E1 Efficiency of the Program			- This option would have similar strengths and weaknesses as option IEQS-1.	- The comments noted under IEQS-1 are also relevant here. - In addition, as discussed under PS-2, senior government enforcement may be appropriate as a back-up to ensure that regulations are enforced uniformly across the province, and may be particularly appropriate in smaller municipalities where economies of scale are insufficient to justify specialized local government staff and equipment for enforcement.
E2 Cost Effects on Industry				
E3 Cost Effects on Municipalities				
E4 Perceived Fairness				
E5 Potential to Mitigate Cost				

OPTION IEQS-2

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G3 Legislative Effectiveness	.		STRENGTHS - One set of clear regulations. - One enforcement body. - Can establish clear protocols. - Can manage public education. WEAKNESSES - Slow implementation (but all such programs seem to require long "education periods).	
L1 Procedure Leading to Prosecution				
L2 Ability to prosecute				
L3 Success in prosecution				
L4 Challenges to the law				
L5 Legal Non-compliance				
L6 Time to Implement program				
L7 Flexibility of the legislation				
L8 Understandability of the regulation				

OPTION IEQS-2

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G4 Administrative Effectiveness				
A1 Enforcement Agency Resources			- Relevant comments on IEQS-1, PS-2 and PS-3 apply here. The IEQS-2 option is weak because it can't enforce BATEA, because senior-level enforcement duplicates existing junior level capabilities, and because it does not make use of incentives.	- Easily adaptible in Ontario (as for IEQS-1).
A2 Municipal Resources				
A3 lab Capabilities				
A4 Recordkeeping Requirements				

OPTION IEQS-5

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G1 Technical Effectiveness			STRENGTHS - existing regulations effectively require BAT - special program for household toxics - financial incentive for industry to comply rapidly - industry could accelerate BAT development WEAKNESSES - divided responsibilities for intermedia pollution - list of toxics not comprehensive - water quality impact assessment not normally required	- Applicable to Ontario as per IEQS-1, plus; - develop appropriate incentive package
T1 Water Quality Improvements				
T2 Intermedia Transfers				
T3 Industrial Compliance				
T4 Monitoring				
T5 Program Review and Updating				
T6 Regulation Comprehensiveness				
T7 Analytical Feasibility				
T8 Regulation Basis				

OPTION IEQS-3

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G2 Economic Effectiveness				
E1 Efficiency of the Program			- This option would have similar strengths and weaknesses as IEQS-1, with the following exception. - IEQS-3 would also offer the additional strength of providing an incentive to industries to reduce toxic discharges below those prescribed by standards.	- Comments relating to option IEQS-1 are also relevant for Option IEQS-3. - In addition (as discussed under PS-4), incentives to reduce toxic discharges could act as a built in mechanism to help ensure that the MISA program becomes more efficient over time.
E2 Cost Effects on Industry				
E3 Cost Effects on Municipalities				
E4 Perceived Fairness				
E5 Potential to Mitigate Cost				

OPTION IEQS-3

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G3 Legislative Effectiveness			STRENGTHS - one set of clear regulations - one enforcement body - can establish clear protocols - can manage public education WEAKNESSES - slow implementation (but all such program seen to require long "education periods)	
L1 Procedure Leading to Prosecution				
L2 Ability to prosecute				
L3 Success in prosecution				
L4 Challenges to the law				
L5 Legal non-compliance				
L6 Time to implement				
L7 Flexibility of the Legislative				
L8 Understandability of the regulations				

OPTION IEQS-3

Factor	Questionnaire Replies	Factor Group Summary	Strengths and Weakness	Application to Ontario
G4 Adminstrative Effectiveness				
A1 Enforcement Agency Resources			- Relevant comments on G2 above and PS-1, PS-3, and PS-4 apply. - This option has the strengths of a senior/junior system and the use of incentives, but these cannot overcome the weaknesses of an IEQS system.	- Easily adaptible in Ontario (as for IEQS-1).
A2 Lab Capabilities				
A4 Recordkeeping Requirements				